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# L 60 Brigádýr -- a Multi-purpose Aircraft .

The Czechoslovak aircraft industry has gained several important successes in the building of light aircraft during recent years .

One of the latest models is the L 60 Brigádýr aircraft. It is powered with a motor of 220 HP, developing a maximum speed of 190 km or 118 m.p.h., its landing speed being merely 55 km or 34.2 m.p.h. The landing range never exceeds 85 metres or 279 ft; under favourable conditions the aircraft can land within a mere 30 metres or 98 ft. The craft is beautifully streamlined, being of shell design with fully enclosed cabin, the top part of which is glazed. The interior can be arranged to suit various purposes. Two seats are located at the front, the rear of the cabin housing either two additional seats and a luggage compartment, or other equipment according to the respective model of the aircraft .

Thus the plane is an ideal multi-purpose aircraft. It is most popular in farming for powder spreading and spraying of various crops. For this purpose it is fitted with a tank for 350 litres or 77 Imp. galls of powder . Compared with foreign aircraft of similar type the Brigádýr has the advantage of enabling field spraying even with chemical emulsions. The output of the aircraft in spreading powder is six times higher than the output of the most up-to-date territorial means of transport . It can be readily converted into an ambulance craft by simply placing two stretchers and an attendant's seat into the cabin. Due to its exceptional liveliness and manoeuvrability, this aircraft has also proved of great advantage for patrolling

and observation as well as for transport purposes, it is a most useful power partner for mapping and least, but not least for sports flying, being able to tow even two sailplanes at the same time .

The success of every product can best be checked by commercial results. The makers of this aircraft can boast with actual orders from and deliveries of their craft to numerous countries. Not only in Europe, but also in Latin America, New Zealand and Australia can the Brigádýr cope to perfection with any job, under the most arduous conditions, irrespective of climatic conditions .

Sole exporter : OMNIPOL, Foreign Trade Corporation, Praha .

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# News of the Czechoslovak Optics at the Third Exhibition of Czechoslovak Engineering in Brno

The production of the FLEXARET reflex Camera was initiated in the year 1939. Since that time the camera has undergone development resulting in the latest models designated the FLEXARET IV, FLEXARET IVA and FLEXARET V. These are cameras without any superfluous and expensive details; ideal cameras for amateurs among whom they have become very popular due to their simple design, high quality, low price and accuracy. Anybody who has ever seen cameras of other makes disassembled will certainly be surprised when looking at a dismantled FLEXARET IV or V. It can be seen that it is quite possible to design, e.g. the release interlocking mechanism, rewind of film and film counter, by using a much less number of parts, though the correct operation of the mechanism is guaranteed and equally satisfactory as that of cameras of a more complicated construction. Similarly the aim of producing a simple, yet accurate and perfectly functioning apparatus can also be encountered with the accessories to the FLEXARET, i.e. filters, adapter lenses, sunshades, cine film adapters, etc.

Interesting is also the design of the OPEMUS, OPEMATUS and, to mention the latest ones, the AXOMAT and OPEMUS II precision enlargers. All of these enlargers are characterized by

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a pronounced individual and unusually attractive outer appearance. An original idea has found realization in their design: an oblique rod along which the apparatus proper is moved by friction up and down. It may be said without exaggeration that these enlargers - as far as their shape and versatility are concerned - still remain unsurpassed on the world market. The latest types, i.e. the AXOMAT and the OPEMUS enlargers are fitted with the possibility of enlarging on colour material. They are light-tight and have more efficient cooling. The electric lamp is housed in a casing made from the so-called black glass through which the thermal rays can pass easily, the light rays, however, being retained. The electric bulb is intensively cooled by an air stream. A special new feature is the "slit focusing". The negative plane can be focused in a simple way which will be appreciated by the user particularly with negatives which are either too dense or too faint. The problem of focusing, which is often a source of trouble to many photographers, has been solved in an ideal way. There is a number of other improvements too, such as newly designed easels, oblique rod fitted with a scale, etc.

Additional enrichment may be seen in further accessories, such as reproducing equipment, etc.

Besides enlargers for amateurs, also universal-type apparatuses for negative sizes of up to 6,5 x 9 cm are being manufactured,

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The MAGNIFAX and MAGNITARUS for negatives of up to 10 x 15 cm in size, the MAGNOLAR of up to 13 x 18 cm in size and, as a true giant among enlargers: the HERKULES, suitable for enlarging of negatives of up to 18 x 24 cm in size.

For use in laboratories, scientific institutes, etc., the MAGNOLA photo camera has been developed. It is not as handy as the amateur cameras, since it has been designed for use with negatives 13 x 18 cm in size. It is, on the other hand, best suited for making photographs of a technical nature in both natural and enlarged size, pictures of architecture, etc. A true contrast to the MAGNOLA is the MIKROMA miniature camera, a very small, attractively shaped apparatus with the aid of which photographers all over the world have succeeded in making enlargements never attained before: from a size of 10 x 14 mm /on 16-mm cine film/ up to a size of 30 x 40 cm and even larger. Its lens /a MIRAR, f/3.5, F = 20 mm/ has been classified by experts as an extraordinarily high-quality lens.

Very well known and popular has become the ADMIRA 8-mm motion picture camera. This camera is also subject to continuous development which may be seen in the subsequent designation of the numerous types, i.e. A, B, C, D, E. The latest model is known as the ADMIRA 8 II; it is equipped with a revolving lens turret for two lenses: f/12.5 mm and f/35 mm. The outstanding features of this camera are: simple design, accuracy and perfect reliability, its price being comparatively low at the same time.

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Two new types of cine projectors have been developed for cine amateurs, i.e. the MEO 8 and the OPTILUX. The first one is intended preferably for home projection; it is of the case-mated type, fitted with a 200 W projection bulb and a luminous flux of about 200 lumens. The second projector has been designed for more pretentious amateurs and clubs; it is equipped with a 500 W /or more/ projection bulb, with a luminous flux of about 50 to 60 lumens. With regard to this luminous performance the OPTILUX keeps abreast with the most efficient 8-mm cine projectors known hitherto.

Next to follow are two further sound projectors for 16-mm film, i.e. the OP 16 and the ALMO 16. These portable projectors are intended both for home projection and for use in clubs, schools, etc. They are best suited for the above mentioned purposes both as regards to their sound properties and intensity of light /the OP 16 with a 500 W bulb provides a luminous flux of about 150 lumens/.

The range of projectors has been supplemented with 2 types of 16-mm sound projectors for professional use: the MEOPTON I and MEOPTON II and, in addition, with a new 15-mm medium-size sound projector of the MEOPTON III type.

The MEOPTON I is a stationary sound projector fitted with a 1000 W projection lamp providing a luminous flux of about 350 lumens. The MEOPTON II is equipped with a high-efficiency arc lamp /Luminous flux 1500 lumens/, and finally there is the MEOPTON III, fitted with a high-intensity arc lamp giving a luminous flux of 3000 lumens.

Sole exporters : KOVO, Corporation for Foreign Trade, Prague.



### VÚS arg. Ms 3 Welding Machine .

The VÚS arg. Ms 3 is the first prototype of an automatic welding machine for welding non ferrous metal strips developed in Czechoslovakia.

The welder is adjusted mainly for the welding of brass strips up to 400 mm wide and 3 mm thick. It can also be used for welding other sorts of non-ferrous and light metals.

This machine will be of great use in rolling mills for non-ferrous and light metals. The welding of several rolled reels together lengthens the rolled strip and the productivity rises almost proportionally with the economy in the processing of this type of semi-manufactured product.

The welds produced by the VÚS arg. Ms 3 welder are of high quality. Their mechanical properties are almost similar to those of the parent metal.

The welds in the strips after the whole of the processing are almost identical with the rest of the strip. They cannot be distinguished in the finished product so that they can form a part of the semi-manufactured product. The VÚS arg. Ms 3 is a fully automatic welding machine with a hydraulic device for clamping the material to be welded.

The edge preparation is done on a special milling machine which insures the correct fit up to the parts to be welded as well as their alignment after welding.

The welding of the strip is done by means of an arc struck between a non-consumable tungsten electrode and the parent metal in an inert atmosphere of argon gas / the argon arc process/. The welds are butt welds without a space between the faces and without a filler metal. The arc is struck by high frequency.

The whole machine is controlled by a central panel on the front part of the machine, where all the necessary measuring apparatuses

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are also mounted. The welding speed can be altered in the range of 200 to 600 mm per min. The argon gas consumption can be set by means of a special reduction valve with grades up to 20 litres per min. The flow of argon can be controlled from the panel so that its consumption can be limited to the time of the welding operation.

Accessories to the machine are a D - C welding current source, preferably the Triodyn 320 or the Praga 500, a cylinder with shielding gas and a special reduction valve with a grading in litres, the necessary lead cables and cooling water leads.

The novelty is on display in the STROJEXPORT stand at the IIIrd Engineering Exhibition in Brno.

# LFK 400/700 Friction Screw Press

Czechoslovakia has a long and successful tradition in the manufacture of and export of presses. Several developed novelties and improvements of types used to date are exhibited at this year's engineering exhibition in Brno. The new forging technology is schematically shown on a whole forging line, which will be in operation. An aid to production and an enrichment of the export programme, which now serves mainly 500 different types of metal machine tools is the type L F K 4 0 0 / 7 0 0 F r i c t i o n S c r e w P r e s s which is especially suitable for precise die forging. Other forming operations like stamping, calibrating, straightening and bending can also be successfully carried out with this machine.

Mention must be made of some of the most important advantages of this double-stand friction press; there are: a raised number of strokes /20 per min./ - in view of the great forming speed forgings with thin walls can be forged - a much more efficient three disc driving system - regulation of the energy of the stroke by means of a programme control of the height of the stroke according to the type of forging - the means for changing the forging effect by means of an additional ring on the flywheel - lengthened lead of the slide, etc.

The press is manufactured with servo controls. The working movement is gained from the friction disc, which is pressed against the flywheel. During the reversible movement of the ram, the flywheel is driven by two friction discs. These are in continuous engagement. The servo control enables work to be done

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with single strokes and continuous running of the ram. The adjustable stops enable the grading of the energy input of the blows. The ram can be stopped in any desired position by means of an efficient band brake. The function of the brake is dependant on the automatic adjustment of the countershaft to the middle position. All sliding surfaces are pressure lubricated. The sole exporter of all presses manufactures in Czechoslovakia is the Strojexport, Foreign Trade Corporation, PRAHA,

## Technical data:

Rated pressure	kg	400.000
Maximum pressure	kg	630.000
Spindle diameter	mm	250
Maximum stroke	mm	450
Maximum number of strokes	per min.	20
Distance between housings	mm	700
Electric motor: output	KW	30
rotations	rpm	1450
Weight of machine	kg	22.000

### SU 63 A Horizontal Center Lathe

In the branch of center lathes Czechoslovakia manufactures 22 types of lathes - from the smallest size for a swing over of 160 mm to heavy duty lathes for a swing over of up to 3150 mm and for a length of the machine part of up to 25 metres. Besides the standard types of common lathes Czechoslovakia manufactures production lathes for mass production, capstan lathes, a number of special lathes for various purposes, various sized Carusell lathes for workpiece diameters of up to 5 meters, semi-automatic lathes and automatic one-and multi-spindle lathes. During the last few years a number of universal lathes of the SU type have been placed on the production programme. These are middle-sized machines for swing over bed of 350-900 mm. Many new elements have been used in their construction and these raise the precision of the work and simplify and speed up the operation of the machine. The large output of the driving motors and spindle and travel speed ranges allow the full use of cemented carbide tools. The machines are manufactured with a simplified design like the production lathes for raised outputs in mass production.

One of the machines in this series is the SU 63 A universal center lathe designed for precision lathing with one or more tools. The advantage of the machine is that it is equipped for the cutting of all kinds of threads with a large pitch. The threads can be toughened by the travel derived from the pinion and gear rod, so saving the lead screw used only for their finishing. One setting of the wheels suffices for each type of thread. Many additional accessories and devices make the type SU 63 A a universal lathe for all types of lathing operations. The rigid construction of the headstock, designed as a fully closed box, lowers vibration to a minimum even when the machine is under full loading. The main spindle, situated on adjustable twin row roller bearings, is driven by a twin rotation switchable electric A.C. motor with a short armature. By means of a drive via a twenty grade gear box with three pairs of changeable wheels five speed grades of the main spindle can be attained. The aforementioned situating of the rotating elements ensure a high geometric precision and flawless surface

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of the machined surfaces. By switching over of the main motor change of the rotation of the spindle can be attained during the cutting of threads or normal lathing. The two hydraulically controlled disc clutches, for starting and disengaging the set speeds, and the two energetically effective shoe brakes controlling the lower countershaft and main spindle respectively, are both reliable. The finish of the main spindle with an ISA taper enables the quick changing of the clamps.

The longitudinal and transversal travel of the carriage is hand and automatically controlled. The direction of travel is controlled by single lever for all directions. The high speed travel of the longitudinal and transverse carriage is controlled by means of pushbuttons placed on the carriage box. The machine is outfitted with adjustable stops which ensure the disengaging of travel without shock with a precision of plus minus 0.01 mm. The reliable lubricating, cooling device and electric equipment are further recommendations for the purchase of the machine.

The sole exporter of all metal machine tools manufactured in Czechoslovakia is the Foreign Trade Corporation Strojexport - Praha.

#### Technical data:

Swing over bed	mm 630
Swing over carriage	mm 375
Distance between centers	mm 1250-800
Spindle bore	mm 60
Width of bed	mm 567
Spindle speed: number of grades	5X24

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range of rotations: I grade	rpm 8-375
II grade	rpm 10.6-500
IIIrd grade	rpm 14-670
IVth grade	rpm 19-900
Vth grade	rpm 25-1180
Threads: 48 metric with a pitch of	mm 0.219 . 48
42 Whitworth	threads per inch 7/8 . 48
48 module, pitch per module	0.54 - 12
36 diametral pitch, coured for 1 in. dia.	3 1/2 - 192
36 circular pitch, pitch in inches	7/256 - 1 1/2
Main motor: rotations	rpm 1420/710
output	kW 17/10
Weight of machine with standard equipment at	
a distance between centers of 2000 mm	kg 5400

LTL 160/1100 Crank Drawing Press

Czechoslovakia, one of the world's five greatest producers and exporters of machine tools, also devotes much attention to the development of new chipless metal machine tools. A novelty at this years exhibition is the type LTL 160/1100 double frame crank press with a toggle retainer for the drawing of sheet metal parts. In view of its great drawing depth - up to 250 mm - this press will be a great contribution to all production shops engaged in the manufacture of bonnets, doors and other motor car body parts, and also those producing fuel tanks, disc wheel, brake drums- or kitchen utensils.

The frame of this crank press is composed of two cast pillars, a steel brace and a steel table. These parts are joined together in a heated state by steel ratchets. The electric motor, the gear shaft with flywheel, pneumatic disc clutch and segment brake are situated on the brace. In the hollow of the brace are the first and second countershafts - and at the bottom the crankshaft with connecting rod on which is suspended the drawing ram. The clamping slide is suspended on the pull rod of the toggle device, placed in the side hollows of the brace. A pneumatic safety valve in the front hollow safeguards against the maximum pressure being exceeded. The press is set in motion by means of electropneumatic switches. The functioning of the clutch is controlled by means of an electromagnetic slide which is controlled by means of push-buttons on both sides of the press. The electric equipment is placed in the cast pillar. Central pressure lubrication is designed for all sliding surfaces. The drawing device is

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built into the table on which is the table plate with clamping grooves.

High productivity is one of the greatest advantages of this press, the servicing of which is very simple and entirely safe.

The sole exporter of all types of presses is the STROJEXPORT - Foreign Trade Corporation, PRAHA.

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Type II 029 Impulse Voltage Winding-Insulation Tester

220 V, 50c/s.

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The tester is intended for detection of insulation faults /interconvolutions short-circuit between armature and stator windings of electric machines/. It is particularly suitable for detection of insulation defects of series produced electric machines. The input of the tester is 450 VA, of the impulse-generator DC of 2.5 kW.

The insulation tester consists of a DC source, an impulse-generator and a measuring bridge with indicator.

During each period the impulse-generator transmits a voltage impulse into the measuring bridge, which stresses the insulation of the tested windings. Balancing of the bridge to the smallest indicator deflection according to two well executed windings is always carried out at the beginning of tests of identical sources.

After balancing one winding is disconnected from the bridge and instead of it the tested winding is connected. In the case of faulty windings /e.g. when several convolutions are short-circuited/, the deflection of the measuring bridge indicator increases substantially.

This new tester is exhibited in the exposition of STROJEXPORT, Foreign Trade Corporation - Praha.

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C u t t e r s   a n d   M a c h i n e s   f o r   P r o c e s s i n g  
o f   F l a x   a t   t h e   E n g i n e e r i n g   E x h i b i t i o n.

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Among the agricultural machinery at this year's Third Engineering Exhibition at Brno there will be of great interest to visitors cutters for green and dry fodder as well as straw when connected behind a threshing machine. There is exhibited, for example, a type R V M 37 blowing cutter for cutting green and dry fodder. It is driven by its own electromotor of an input of 5.5 kW which drives a blade wheel up to a speed of 300 r.p.m. The machine weighs approximately 400 kg. In an hour it cuts up either 14 q of dry fodder or 20 q of green fodder. It conveys dry fodder up to a distance of 25 m. With the type RM 42 blowing cutter green and dry fodder can be cut, connected behind a type MA 90 threshing machine it processes also straw. The cutter is driven by its own electromotor of an input of 12 kW. The speed of the blade wheel is 500 r.p.m. The cutter conveys cut fodder to a distance of 8 m and a height of 15 m. Its capacity is 40 - 60 q of dry fodder, or 120 - 200 q of green fodder per 1 hour. The length of the chopped straw is 2 cm. The machine is fitted with a laminated clutch and a feeding regulator which prevents choking up of the exhaust.

As a special novelty there is exhibited also the type R R M rotary cutter for cutting green and dry fodder and straw when connected behind smaller types of threshing machines. Its capacity is approximately 20 q dry fodder per hour. The material is conveyed to the blade wheel by a caterpillar chain. The processed material is conveyed,

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in the case of green fodder, to a distance of 8 m and a height of 15 m, and in that of dry fodder to a distance of up to 30 m and a height of 15 m.

Among the machines for processing flax there is the type **FLZ 120** flax puller. It is driven by the extended tractor shaft. It is designed for pulling flax and spreading it behind the tractor. It consists of a frame, working and travelling under-carriage, gears, pulling units, lifting points, a depositor and a travelling and working trailer. The working trailer is movably connected with the frame. The pulling height during operation is adjusted by tilting the frame against the working trailer by means of screws and a crank. The torque of the drive from the tractor is transmitted by a shaft to a gear coupling. The gears themselves consist of spur gears with milled teeth. The pulling mechanism consists of three pairs of endless rubber-textile bands on pulleys which are pressed against each other by five pairs of pressing-on pulleys. The depositor consists of a sheet-iron table around which run three igelite bands with carrying nails. The lifting points are turned by means of a lever and pull-rod. The operating width is 120 cm, the capacity of the machine per shift (8 hours) being 6 ha.

An important novelty are machines for further processing of pulled out flax. Here belongs first of all the type **SLOZ** flax collector with a seed separator and binder designed for collection and separation of seeds and binding of the dried flax pulled out with the puller. The machine is designed not

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only as a trailer pulled behind a tractor, but it can also serve independently as a flax threshing machine directly on the field or in a barn. As a trailer connected behind a tractor it has a capacity of approximately 4 - 5 ha per one working shift. The under-carriage of the machine is manufactured of pressed sheet-iron sections. The front wheel can be steered by a lever from the operator's post. A similar machine is the type SLUZ collector of bedewed flax which also operates as a trailer connected behind a tractor. The machine collects bedewed flax from rows and binds it into small bunches which are suitable for further breaking processing. The daily capacity of this machine is approximately 2 - 3 ha while its weight is approximately 470 kg. On the undercarriage there is mounted the collecting mechanism which duplicates the ground. During transport the collecting mechanism is lifted from the operator's post. On the machine there is also mounted a binding mechanism. The drive of the machine is transmitted from the travelling wheels of the machine.

Besides the above mentioned novelties there are analogous types supplied to a great extent to Finland, Ireland, Greece, France, India, Egypt, South America, etc. The sole exporter is the foreign trade corporation of Motokov - Praha -  
Czechoslovakia.



### Czechoslovak Hunting and Sporting Arms

Czechoslovakia is not a newcomer among the producers of hunting arms of all kind and has in this respect a respectable tradition. Trade mark Zbrojovka has already been for many years a reputation for reliability and accuracy among hunting enthusiasts.

#### Hunting Rifle Brno ZG 47

A modern hunting rifle ZG 47 which will satisfy the most pretentious requirements of customers all over the world. The rifle ZG 47 is constructed and manufactured in the following calibres: 7 x 57, 7 x 64, 8 x 57S, 8 x 60S, 8 x 64S, 30 - 06 Springfield, . 270 Winchester, 9.3 x 62 and is to be manufactured in calibres 6.6 x 61 Super express /vom Hofe/ and 10.75 x 68. This rifle can also be equipped with a barrel for a cartridge the total length of which does not exceed 86.5 mm.

The bolt mechanism of this rifle is the improved Mauser bolt. It has a fifty years tradition and is still unsurpassed in sturdiness and function. With the rifle ZG 47 the Mauser bolt is improved by:

- a/ a safety device enabling manipulation even with a lowly mounted telescope. The safety device is placed on the right side of the bolt. By turning it in the direction of shooting it secures the hammer against firing and the handle of the bolt against opening; by adjusting it towards oneself it gets into the free position /ready to fire/.
- b/ a new type of trigger, which is neither an oversensitive trigger with releasing spring nor a double slow trigger which is common with military rifles. It is a short, soft trigger with an adjustable length of release, with an adjustable back lash elimination and an adjustable weight. It is quick-acting and reliable.

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- c/ the bending of the bolt handle and its form enables the lowest mounting of the telescope at a safe manipulation with the bolt.
- d/ a tipping bottom of the magazine which enables removing of the undischarged cartridges from the arm without manipulating the bolt.
- e/ a bolt case provided with longitudinal dovetail ledges for mounting the telescope which enables mounting without any adaptation which up to now has not been solved on any rifle of this kind.
- f/ a simple rear sight adjustable sideways by means of the screws and an interchangeable sight.

The gun-stock of the rifle ZG 47 is manufactured in double standard and luxury executions.

#### Technical data of the rifle:

Weight of rifle .....	3.5 kg	
Length of rifle .....	114 cm	
Length of barrel .....	60 cm	
Number of cartridges in magazine /mentioned calibres /		- 5
Number of cartridges 10.75 x 68 or similar		- 4

Besides the above-mentioned improvements the ZG 47 rifle is distinguished by a quick, reliable and smooth action. The system of the rifle offers many further alternatives which will be successively put into effect in the future.

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Small bore rifle "Hornet" .22 Brno

This light small-bore rifle is equipped with a miniature Mauser bolt. It is built only for the .22 Hornet /5.6 x 36 R/ cartridge with a single row removable magazine holding five cartridges. The rifle is suitable for shooting small game. The bolt case is provided with longitudinal ledges for mounting the telescope and with a safety device on the right side which secures on the one hand the hammer against firing and on the other hand secures the bolt handle against opening. The arm has a double adjustable trigger with a releasing spring, a triple rear sight for distances of 100, 150 and 200 metres.

It is manufactured only in half-stock with a front stock and pistol handle. The handle is provided with a hand-carved dovetail from first-class impregnated nut wood. In various parts of the world hunting specialists consider this light rifle to be the most up-to-date and most accurate small bore rifle of its kind. It should not be a "must" in the equipment of all hunting expeditions, among fur hunters sport marksmen or rifle enthusiasts in general.

## Technical data of rifle:

Weight of rifle .....	2.8 kg
Total length of rifle ....	105 cm
Total length of barrel ...	58 cm

It is remarkable for its smooth, safe handling, high accuracy, sensitive trigger and fashionable shape.

Small bore rifle Brno for .22 long rifle cartridge

This is a rifle used by wide circles and is popular all over the world. It is manufactured in series of 100,000 and serves for sports rifle training, for small game shooting and birds

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and, if specially equipped, also for competitive marksmanship.

It is manufactured in four types:

- Light sporting small bore rifle Brno ZKM 451
- Special extra sporting small bore rifle Brno ZKM 452
- Competition sporting small bore rifle Brno ZKM 455
- Improved competition sporting small bore rifle Brno ZKM 456

These four types have a uniform bolt system; a bolt of cylindrical shape, provided with a locking segment with a smooth run. A short stroke of the hammer and a wing safety device placed on the rear side of the bolt enable manipulation even with a lowly mounted telescope. In addition it secures the hammer against premature firing and the bolt handle against opening. A simple trigger is adjustable on length and weight of the resistance and simultaneously on back lash elimination. A single row removable magazine with a capacity of five cartridges is used with these small bore rifles. Great care has been paid by the designers to solving the problem of charging the cartridge from the magazine directly into the chamber. They achieved a direct charging and inserting the cartridge without slide and without deforming the bullets, something which remains a problem with arms of this type of foreign production.

Forgings used for production of the barrels of the above-mentioned types of arms are from first-class special alloy steels of high solidity and durability.

By 1945 Czechoslovak designers prepared for mass production already a new type of triggerless double barrel shot-gun which was also in the same year successfully introduced on the world market.

It is a gun designed only for hunting and is manufactured in 16 and 12 calibres. This light and sturdy gun of reliable function is equipped with Purdey bolt, with locks of the Holland-Holland type; it is equipped with simple drawers or automatic

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ejectors. The gun-stock is either English or with pistol handle of a first-class luxurious wood. The marksmanship of this gun has maximum results.

Shotguns 3 are manufactured <sup>either</sup> in a simple execution or with a tasteful machine engraving. This gun, in addition to the above-mentioned qualities is remarkable for its simple striking mechanism.

Technical data of shotgun Brno Z, calibre 16:

Weight of shotgun .....	2.9 kg
Total length of shotgun ..	112 cm
Total length of barrels ..	70 cm

This shotgun has gained great popularity all over the world. It is manufactured in series of 100,000.

All types of hunting guns here mentioned are equipped - at the desire of the customer - with an art engraving, either plastic or smooth according to own themes or the themes of the customer. They are also equipped with engraving with golden relief of game or with ornamental relief.

The sole exporter of all hunting and sporting guns is the foreign trade corporation Omnipol, Praha.

Dolonit - Glasses for 100 Years.

The development of technical science has also enabled increased protection of human health.

For the first time hinges on glasses have been eliminated. For the first time glasses have been made from one piece of material. These glasses made from nylon have been called Dolonit. They are manufactured by a well-known process - injection moulding.

On these glasses the hinges are just the most durable and the strongest part. Their durability has been tested on a special machine. The hinge has undergone 1,993,000 bendings by 180° without having been damaged. Only when observed under a microscope was it ascertained that the material showed signs of fatigue. In practice it means that the glasses would last 39,860 days, i.e. approx. 110 years were the user to bend them fifty times a day.

Dolonit glasses will resist without any damage temperatures of from -20°C to +150°C. They are made from one piece of material and in one manufacturing process.

They can be dyed perfectly with a special dye. Dolonit glasses can be used as sun-glasses as well as dioptric spectacles. It has been ascertained by tests that the possibility of breakage of the lenses of Dolonit glasses is reduced by 30 %. The elastic nylon softens all shocks in the case of a fall. It results from the above facts that Dolonit glasses are universal. The facts that the hinges need not be made of metal as hitherto as well as that glasses can be unbreakable

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are continually being followed up in Czechoslovakia and further developed technically.

The sole exporter is the foreign trade corporation of KOVO, Praha.

### PSA and PSPB Brazing Sets .

Brazing requires completely different heating conditions than welding. These are a lower flame temperature and a softer flame with a less concentrated heat effect. The use of an oxy-acetylene welding torch is therefore not only uneconomic but also technically less advantageous. Unnecessary dirtying of the brazed parts with soot reduced from burning process takes place when using a flame reducing device for lowering the flame temperature. An independent brazing set which uses a flameable gas without oxygen, which sucks in the surrounding air, is not only more economic but also cleaner and has the most advantageous flame setting.

The PSA Brazing Set for soft and hard brazing burns a flameable mixture of acetylene and air. Only acetylene from high pressure generators or acetylene cylinders can be used. The set consists of the handle with a regulating valve, four changeable Bunsen type tips, a flat and sharp hammer for soft brazing and an extension. The hammers with the appropriate sleeves are fixed to tips Nr. 1 and 2. The larger tips are designed for free brazing, tin plating, local heating, etc. When working with the hammers the tips are fixed right on the handle, a bent extension is fixed to the handle and so enables free brazing with any of the tips. In this set-up the torch looks like a welding torch and is used for hard brazing and free soft brazing.

The PSPB Brazing Set is designed for the flameable mixture propane-butan-air. Its design is analogous to the acetylene set described above. Its advantage is in that it makes use of propane which is much cheaper than acetylene and easier to transport in small cylinders. To enable the use of propane for brazing, it was necessary to achieve stabilization of the flame because propane has a low burning velocity. With the stabiliza-

tion, which is done by means of the special design of flow holes a stable flame is achieved even when the boundary burning rate is exceeded. It is so possible to get a flame the hardness of which equals that of the acetylene flame.

The output of both sets can be regulated in a wide range. The burning stability is kept up in a pressure range from 0,1 atm.g. to 1,5 atm.g. By combining the four tip sizes and the pressure a flame of almost any intensity and hardness can be attained in a very wide range.

These exhibits can be viewed in the stand of STROJEXPORT, their sole exporter.

### Electronic Control of Resistance Micro-Spot Welding Machines.

Resistance welding is still the most widely used method of joining two metal parts in specialized production, especially in the manufacture of instruments, electronic valves, bulbs, etc. The reason for this is the high productivity of this welding method, clean welds and minimum damage to the area surrounding the weld, the ability to weld delicate parts and the good electric conductivity of the resistance weld. The important thing is that non-ferrous metals can be joined by means of resistance welding.

Micro-spot resistance welders with electronic controls are designed for this type of welding.

The conditions of the control of micro-spot welders are various according to whether welding is done directly, or by means of stored energy. When welding with a direct energy source, another deciding factor is whether the welding current is half or full wave.

The most common micro-spot welding in practice is that by means of a full wave current. In this sense the micro-spot welder is not different from large machines. Only the auxiliary time programme is left out. The required precision of control is very great, because only short time welding is done on micro-spot welders.

The apparatus of the type EROS-MB has been developed for the full wave control of micro-spot welders.

In principle the apparatus can be divided into two parts i.e. the electronic (thyatron) contactor and the relay for

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the time control of the contactor. The electronic contactor of the EROS - MB is controlled by a D.C. current.

The control is done by means of directly time limited voltage "oblongs" which form the control relay. The ignition angle of the thyratrons, which form the electronic contactor, can be smoothly set.

The relay for the D.C. control of the electronic contactor is synchronous and single impulse. This relay is commonly designed with two thyratrons and three D.C. sources.

One system of a synchronous relay for uniform control of the electronic contactor also works with two thyratrons but with only one D.C. source. Despite this great simplification the relay has all the qualities for the accurate and symmetric control of the electronic contactor under inductive loading. The apparatus is designed for the accurate control of micro-spot welders. Its further use is for synchronous single impulse control of ignition contactors as, for example, the Křizík product of the type KSI 200. In this manner it is possible to combine a simple and effective control even for large spot welders or welding presses. The welding time can, if need arises, be widened to 50 periods.

#### Technical Data.

Mains voltage	220 V or 380 V - 50 c/s
Maximum output under 40% loading	3.6 kW or 6.45 kW
Welding time	1 to 10 periods
Welding output range	100 - 20%

POOR ORIGINAL

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Adaptability to the case  
of the welding machine

1 to 0.2

Construction

Panel and box  
type

This novelty is exhibited in the stand of the foreign trade  
corporation of Strojexport.

POOR ORIGINAL

# Automatic Welder for Welding Branches of Boiler Chambers .

The SNK 500 single purpose automatic welding machine is a portable apparatus for the submerged - arc welding of steel boiler branches or similar parts. The apparatus can weld branches 30 to 110 mm in diameter with a welding wire 2 or 1,6 mm in diameter at a constant speed, which can be set by means of changeable gear wheels. It weighs about 25 kg, the welding current is either A - C or D - C up to 500 Amps. The welder is fixed to the inside of the cylindrical area of the boiler branch and rotates round its axis. At the same time the double tracing mechanism ensures the perfect tracking of the necessary space curve of the weld by the welding arc without being influenced by manufactured errors in the shape of the curve of the branch cylinder. The rotation mechanism of the automat and the wire feed mechanism are driven individually by two non synchronized electric motors. The speed of these two movements is set by the changeable gear wheels:

the travel speed from 15 to 30 m/hr, electrode wire feed rate from 120 to 480 m/hr. During production the automatic welder is fixed to a moving arm which enables it to be easily and quickly shifted from one branch to another. The SNK 500 is designed primarily for use in boiler manufacturing workshops for the welding of branches in either round or square boiler chambers, but it can also be widely used in other production lines, wherever the work consists of mass production welding of round parts of the above mentioned dimensions and that not only hollow but also filled parts.

According to production trials the actual welding time has been lowered by the use of the automat to 1/4 of actual hand welding time and simultaneously the consumption of electric energy has been lowered to 1/5 of the previous consumption. The welding wire consumption shows a saving of 50% /in Czech Crowns/ in comparison

with the use of hand welding electrodes. A further 25% is saved in joint preparation, but an additional cost of welding flux arises.

This automatic welder which represents a 100% increase in productivity is exhibited in action at this year's Engineering Exhibition in Brno in the STROJEXPORT stand.

## Basic Technical Data :

Range of branch diameters	30 to 110 mm
Minimum diameter of the cylindrical preheating chambers	Ø 150 mm
Electric wire diameter	2 mm event. 1,6 mm
Welding current	A-C or D-C up to 500 amp.
Feed. voltage of the contactor box	3 x 380 V + 0,50 c/s
Contactor box input	
minus the welding source/	500 V amps.
Weight of the welding head	about 25 kg

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### The SUM 1000 Welding Tractor .

The SUM 1000 welding tractor is the latest Czechoslovak automatic universal submerged-arc welder.

It consists of the tractor, control box, connecting cables and a set of fixtures for the automatic leading of the arc along the weld gap.

In comparison with the type of welders used up to now it has several advantages, e.g. its small weight /which without welding wire and flux is about 42 kg/, reliability, simple control and means of smooth setting of the welding values.

The electrode feed speed regulation is a unique design which enables its use for an independent feeding rate which can be smoothly set, or for feeding automatically regulated by the arc voltage. One of these two methods is selected by turning a switch in the control box. The welding speed can also be smoothly set for a wide range. It is controlled by the change of revolutions of the driving electric motor by means of a newly developed vibration regulator. By fitting the intermediate gearing into the gear mechanism an overall travel speed range of 1 : 40 was obtained. Use of the undercarriage itself was also calculated for other purposes /e.g. for oxygen cutting/. For this reason a pair of changeable wheels was added to the reduction mechanism which enables the speed to be slowed down by a half.

The start and finish of the welding operation is automatic with both electrode wire feed systems.

The use of the tractor is widespread. It can be used for making both straight and circular butt joints, ordinary and grooved fillet welds, plug welds and root welds; it can also be used for hardfacing. The height of the nozzle is adjustable and its tipping angle can also be adjusted in a wide range. Welding

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can be done with the nozzle between the wheels of the undercarriage or away from them. The tractor can travel either along the material itself or along a track of its own. Small deviations of the electrode at the weld gap can be adjusted even during welding by means of a transversal support on the undercarriage. In certain cases the welding head can be suspended from the underside of the undercarriage, or used by itself. The control box which is fixed to the tractor is detachable so that the tractor can be controlled from a distance.

The tractor can also be used for welding inside cylindrical vessels of a small diameter. The smallest diameter of a vessel in which the tractor can be used is 750 mm. Because of these qualities the SUM 1000 welding tractor can be used for batch production and also for individual production, in the workshop and for field work.

This type of welder is to replace the older types of welding tractors and will also be introduced to those branches of industry where submerged arc welding is not yet in use.

#### Basic Technical Data :

Electrode wire diameter	1,5,2,5,3,15,4,5 mm
Welding current	A-C or D-C up to 1000 amps
Control box input /without welding sources/	0,6 k v ct.
Feed voltage of control box	220V, 50 c/sec.
Weight of tractor	42 kg
Dimensions of tractor in mm /length, width, height/	700 x 300 x 500

This machine is exhibited at the IIIrd Engineering Exhibition in Brno, in the stand of STROJEXPORT, its sole exporter.

# BK 60 Multi Spot Welder.

With the growing production requirements and especially the requirements for higher productivity chiefly in mass production and automatic processes, the need arises to develop new types of welding machines of both standard and single purpose types.

Spot welding machines form the mainstay of resistance welding apparatuses in the form of either static machines or suspended spot welding guns. Standard resistance welding machines are to a large extent universal, have a wide welding range and can be incorporated into either highly efficient mass production or in specialized departments /repair workshops/. The choice of the machine naturally depends on its payoff and on the possibilities of the current supply.

A novelty for our motor car body works is the BK 60 Multi-Spot Welder, which can be used for production work requiring the joining of parts by a large number of spot welds made in thin low-carbon steel sheets 0,8 to 1,5 mm thick. The welding pressure and the whole design are suitable for the welding of thin sheets. It is of course designed so that it can weld larger thicknesses than 1,5 + 1,5 mm. These can however be welded only by single spot welds. Fundamentally the thickness of the thinner sheets in the location of the spot weld should not exceed 2 mm. The machine is of the latest conception and surpasses the older types used up to date in that it raises the production rate by more than three times.

The welding gun is driven by an electric motor and the crank mechanism for the linear reversible movement of the upper electrode is combined with a pneumatic cylinder which exerts the necessary welding pressure. This arrangement enables the full utilization of the twin working lift and the plot of the pressure diagram is rectangular. The welding pressure can be smoothly regulated by means of a pressure reducer. The switching on of

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the primary current is done by means of an electronic contactor. The machine is completely controllable and all of its parts, both mechanical and electrical, are easily accessible. The throat depth can be adjusted by the moving of the upper arm and the lower mounting pivot according to the size of the welded work-piece. Apart from that the lower arm can be adjusted for a different throat width.

## Technical Data :

Welding output for clean car body steel sheets	2 x 0,8 to 1,2 mm
Working lift	10 mm
Auxiliary lift	60 mm
Number of spot weld per min.	200 min. for max. sheet thickness
Throat depth, alterable	600 to 1200 mm
Necessary air pressure	200 to 680 mm 6 atp.
Welding pressure	100 - 400 kg
Primary voltage	380 V
Grades of welding current regulation	10
Compressed air consumption	0,5 m <sup>3</sup> /hr
Cooling water consumption	150 l/hr
Weight of gun	about 1200 kg

The multi-spot welding gun is exhibited in the STROJEXPORT exposition at the IIIrd Engineering Exhibition in Brno.

### T 032 Welding Set .

The continuous introduction of aluminium fabrication places great requirements on the solution of its permanent joining. The best results have been obtained by welding in a shielding atmosphere of an inert gas /argon/ which by excluding air enables the forming of a clean unoxidised molten metal and so of a perfect homogenous weld.

The T 032 welding set which was developed and introduced into production in Czechoslovakia, is designed primarily for the welding of aluminium conductors, aluminium alloys and metals which up to date have been difficult to weld, for instance:

copper, brass, stainless steel, nickel, etc. With this welder, welds can be made on wires 0,2 to 7 mm dia., on profile conductors with a cross section up to 35 mm and sheets up to a thickness of 1 mm.

The electric arc burns between a non-consumable tungsten electrode fixed in a holder, and the material. The set is designed as a mobile box, with steerable front wheels. It is equipped with a carrier for an argon cylinder containing 10 litres of argon. Thus the set can be easily moved to other work sites.

The principles of connection of the set are shown in the picture. The welding current travels to the electrode holder via the contactor, damper with switchable taps, condenser battery and ionizer. The welder is set into motion by pressing the button mounted in the handle of the electrode holder. On request, this can be changed to a foot switch.

The condenser battery connected into the welding circuit prevents the origin of a D-C current which occurs when welding aluminium with an A-C current, and which extinguishes the arc at low values of A-C current. The battery is bridged by a switch by means of which it can be disconnected to prevent its being

damaged when other materials are being welded. The ionizer which is connected in series with the welding circuit facilitates the striking of the electric arc /without the direct contact of the electrode/ and keeps the electric arc stable during welding.

The argon is fed to the torch from a steel cylinder via an electromagnetic valve. While in operation the torch is cooled by running water.

#### Technical Data :

Intake voltage	220 V, 50 c/ps.
Maximum input	7 kVa
Graded regulation of welding current	4-5-5,3-8-10-12,5-16-20-25-32 Amps.
Loading	30%
Condense battery capacity	11250 $\mu$ F
Ionizer	spark type
Connection	in series
Frequency of high frequency voltage	about 3 - 7 MHz
Amplitude of high frequency voltage	about 5 kV
Primary current	32 Amps.
Secondary voltage, unloaded /max./	220 V
Dimensions /max./	630 x 545 x 660 mm
Weight of set	93 kg

The advantage of the T 032 welding set is that it is better for the quality welding of aluminium conductors than all the other methods known up to date. With regard to the fact that no chemical cleaners need be used for this welding method, the welds are unusually resistant to corrosion.

This novelty is exhibited in the STROJEXPORT stand at the IIIrd Engineering Exhibition in Brno.

# MB2 Type Micro Spot Welding Machine .

Resistance welding is one of the most efficient modern production methods. In many plants, however, full use is still not made of all the advantages which can be derived from this technological process. In many cases this is dependent on the types of standard or special machines used there.

Among others the type MB 2 apparatus for micro-spot welding has been developed recently. It is an automatic table type welding machine designed for the welding of thin sheets and wires. Its range of use is wide /e.g. for the production of delicate apparatuses, electrical equipment, etc./. The welding pressure is obtained from an electric motor via a lever mechanism and a regulated spring which indicates the welding pressure on a scale in kilograms. The throat depth and the throat width of the machine can be altered. The welding is either controlled by a synchronized electronic control which has a smooth periodic regulation of the output and welding time or by a non-synchronized time relay with an output regulation by means of a regulating resistance in the primary winding of the welding transformer which has four setting grades on its secondary winding. The machine works automatically and does not require a compressed air lead. The welding of single or multiple spots is controlled by foot pedals. The machine is highly productive and ensures absolute quality of the welded joints.

The micro-welder is displayed at the STROJEXPORT stand at the IIIrd Engineering Exhibition in Brno.

## Technical Data :

Controls	Synchrone Electronic	With a time relay
Primary voltage	380 V 220 V 380 V 220 V 120 V	
Welding transformer output	2,35 kva 1,35 kva 2,35 kva 2,35 kva 2,35 kva	

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Working lift	3 + 20 mm	3 + 20 mm
Throat depth	100 + 150 mm	100 + 150 mm
Throat width	70 + 100 mm	70 + 100 mm
Welding pressure	20 kg	20 kg
Welding output for incessantly clean metal sheets of a single thickness	0,8 mm 0,5 mm	0,8 mm
Steel wire of max.dia.	2 mm	2 mm
Dimensions	505 x 230 x 340 mm	
Weight		40 kg

### SAP 400 Semi-Automatic Argon Shielded Arc Welder.

This semi-automatic welder can be used for making short irregular shaped welds in aluminium and some of its alloys, also for welding stainless steel in a carbon-dioxed shielded atmosphere.

It welds with a D-C current with a consumable electrode 1,2 to 2 mm in diameter. The electrode feed rate is constant from 2 to 12 m/min. The feed rate can set in 9 grades by means of changeable gear wheels.

The apparatus consists of the contactor box, feed mechanism and welding gun.

The feeding mechanism is light and easily portable and can be fixed to the contactor box, which is mobile. The welding gun itself is connected to the feed mechanism by 5 channel cables 3 m long. The cables conduct the welding current, electrode wire, shielding gas and cooling water. The used water is also controlled by means of this cable. The nozzle of the gun and the feed tips can be easily changed. An adjustable spur can be fixed to the gun nozzle which serves to help maintain the distance from the material. The electric motor of the feeding mechanism, the electro-magnetic valve and the welding current contactor are controlled by means of a switch in the holder.

The described semi-automatic welder can be used in the manufacture of equipment for the food industry, chemical industry and electric power industry and in many cases where an automatic welder cannot be used. It can be used in the motor car body industry /with carbon dioxide/ and everywhere where submerged arc welding cannot be used owing to the excessive curvature of the material.

It is an economic asset as a substitute for the low productive hand welding of non-ferrous metals. Semi-automatic welding re-

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places covered electrodes and at the same time limits the deleterious individual effect of the welder on the quality and appearance of the weld. In many cases very expensive operations for finishing the weld like grinding, forging, etc. are eliminated by use of this welder.

This semi-automatic welder can be seen in action in the stand of the STROJEXPORT, export Company at the IIIrd Engineering Exhibition in Brno.

#### Technical Data :

Electrode wire diameter	1,2 ; 1,6 and 2 mm
Welding current	D-C up to 400 Amps
Electrode wire feed	An independant rate which can be set in grades.
Electrode wire feed rate	from 2 to 12 m/min. in 9 grades
Length of lead cable of the welding holder	3 m
Argon gas consumption	14 - 18 l/min.
Rated input of the contactor box /without welding source/	500 vamps
Weight of welding holder	1,3 kg
Weight of feed mechanism	12,5 kg

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### RNS 1000 Oxygen Cutting Torch.

The technological processes of many steel mills and engineering workshops include the process of cutting up or the cutting off of massive steel parts of large thicknesses. For this reason the prototype of an oxygen cutting torch of the RNS 1000 type was developed in Czechoslovakia.

The RNS 1000 works with an under-critical rate of oxygen in the jet i.e. with the economic low pressure of oxygen. The deep cut is attained by means of a regulated flow of oxygen to a great distance from the cutting tip. The oxygen is regulated in the long lead tube of the torch before the tip, and travels to the material without any great turbulence over the mirror polished surface of the jet. The cutting process requires a great heat output of the heating flame, which is attained by increasing the flow of acetylene with propane buthan at a ratio of 1 : 1 if the former comes from a low pressure generator.

The cutting head is water cooled. The low pressure cutting torch RNS 1000 can be expected to be a great asset to the rise in the productivity of steel mills, founderies and forges.

#### Technical Data :

Cutting oxygen pressure	0,5 - 3 atp.
Heating oxygen pressure	6 atm.g.
Acetylene pressure	0,7 atm.g.
Cooling water pressure	1 atm.g. min.

The prototype is exhibited at this years IIIrd Engineering Exhibition in Brno, at the STROJEXPORT stand.

### BS 320 Petrol-Electric Welding Machine.

Construction jobs carried out in places where it is impossible to connect the welding machine to an electric current source, require the use of highly productive welding machines with a drive that is independent of the local conditions. This requirement is solved in two ways: by connecting the welding generator to either a diesel or petrol engine.

An ideal aid for this type of work is the petrol-electric combination, the BS 320, which by its output and overall weight is one of the best machines of this type.

The actual welding current source is a Triodyn D - C welding dynamo which in combination with an electric motor has for many years successfully competed in the world market. The welding dynamo works on the three dynamic machine principle, the first machine is a compound exciter, the second is a compound welding current generator and the third a series engine which adjusts the voltage of the welder to even the fastest change in the arc without magnetic inertia.

The welder has two ranges :

- 1/ from 30 to 130 amps. at 15 to 20 V
- 2/ from 120 to 320 amps. at 20 to 30 V

An unloos voltage of 90 V enables the easy striking of the arc and is not dangerous. The current can be smoothly set according to the gauged toroidal regulator, which is incorporated in the control panel. If the work site is some distance from the welding current source, the regulator can be detached and the regulation can be done directly from the work site. It weighs 1,8 kg.

The welding dynamo has excellent welding properties, a very good static and dynamic characteristic which is suitable for all welding techniques.

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The driving member is composed of the ŠKODA 1201 combustion engine. It is a four stroke petrol engine with four cylinders, a carburettor and suspended valves; the engine is water cooled. It is equipped with an automatic regulator of revolutions, an electric starter and a damp air cleaner.

#### Technical Data :

Engine	Škoda 1201
Number of cylinders	4
Capacity of cylinders	1221 cc
Compression ratio	7 : 1
Maximum output under continuous loading	30 hp/3000 rpm
Maximum measurable consumption	225 g/k/hour/3000 rpm.

The dynamo and the engine are connected together by a flexible coupling and form an inseparable complex which rests on four stands in a welded frame. The frame is by means of leaf springs placed in a two wheel undercarriage equipped with a shaft with a ring for attaching to a motor vehicle. The low centre of gravity ensures the good stability of the truck.

The switchboard in the front part of the machine enables the centralized control of the whole equipment. The welder is suitably covered, including the wheels and the mud guards and bonnet form a neat entity. A further advantage is the small weight of the welder and easy moveability. In view of its stability it is especially suitable for site construction.

The "ready to weld" weight of the BS 320 welder is 700 kg. This novelty is on show in the STROJEXPORT stand at the IIIrd Engineering Exhibition in Brno.

The T ol2 Welder

is designed for welding aluminium conductors (during the manufacture of electrical rotating machines); the welding is done in a shielding atmosphere of argon. All diameters and numbers of wires can be welded up to a total 6 mm diameter of welded sheaf.

Wires of badly weldable metals such as copper, brass, constantan, Nickel, manganin and stainless steel can be welded under the same conditions.

Owing to the fact that the arc burns in a shielding atmosphere of inert gas (argon), the molten metal is kept clean and unoxidized and therefore forms a flawless weld.

The welding current flows through the electrode holder via a contactor and regulating damper, a condenser battery and the secondary of the ionizer. The welding arc burns (in a shielding atmosphere of argon) between the workpiece and the tungsten electrode which is clamped in a special holder.

The arc is struck only after a push button on the holder has been pressed (the push button can be replaced by a foot switch). The high frequency ionizing current enables the arc to be struck without the electrode touching the material; this increases the stability of the arc during welding.

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When using the special electrode holder the welding time is controlled by means of a time relay; the time needed for welding is considerably shortened by the use of this automatic holder. The welds have a high grade of quality and the operation is simple and easy.

The machine is on view in the stand of STROJEXPORT foreign trade corporation, Praha.

# R S O - Mikron Portable Oxygen Cutting Machine.

During the last few years attempts have been made to substitute hand oxygen cutting by automatic oxygen cutting in the widest possible range. The aim of this has been to raise the quality of the cut part and lower - or even completely eliminate any further machining of the cut surface. In many cases a clean oxy-acetylene cut has completely substituted long and costly machining operation. The immobile cutting apparatuses which have been used up to now are of course limited by their permanent placing and by the transport of the material to be cut to the apparatus and back, irrelevant of the fact whether the operation was large or small. Large workpieces and parts on which only a small cutting operation need be carried out, require the use of a portable automatic cutting apparatus, which must have a wide range of uses if it is to take the place of a handcutting apparatus. The main weakness of all the portable machines used up to date and which can be <sup>used</sup> only for straight or circular cutting is, that they often need large leading fixtures and are besides exceedingly heavy. It is apparent that a portable machine weighing 20 kg with a limited working capacity is no aid in construction work which is often done outside the workshop. The operator then has to depend on the hand cutter. This situation stimulated the attempt to design a small machine as light as possible which could be used not only for straight and circular cutting but also for the cutting of shapes while being led by hand, and which would enable automatic cutting in cases the earlier cutting machines could not cope with.

A whole series of small cutting machines weighing from 5 to 8,5 kg produced in Western Europe /West Germany, Sweden, Great Britain and France/ more or less fulfill the above mentioned requirements. The best designed machine is the "Cadet" manufactured by the West German firm Kjelberg-Eberle, Frankfurt a/M which however is the heaviest of the series. It is however the

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only machine with a hand clutch which is indispensable for the cutting of complicated shapes. It is also the only machine with an at least partly mechanized servicing of the torch.

The Czechoslovak design R S O - Mikron represents the most modern solution of the aforementioned problem up to date. It is sufficiently light /weight 6,5 kg/ and can be used for straight and circular cutting and also for the cutting of shapes and the service of the torch is done by means of two control pushes.

The machine is made up of a number of light alloy precision castings. It is operated by a universal 50 W motor for an electric light current source with a complete regulation of revolutions which corresponds to the travel speed range of 100 - 800 mm/min. The motor with the regulating equipment and gear box forms the backbone of the machine which during operation rests on three points. The front part rests on two traversing wheels and the back part rests on a ball spur. One of the traversing wheels is the driving wheel the other is free. By disengaging the clutch which is controlled by a tap-like switch on the lead handle of the machine both wheels can be disconnected and the machine can be moved by hand without the motor drive. Use of this is made when making small curved and sharp corner cuts.

The injector type torch is fixed in a support system in the direct vicinity of the driven wheel and has special one piece tips with many openings. The supports enable the torch to be projected to the side of the machine, tipping to an angle up to 45° for level cutting and fire adjustment of the distance to the surface of the material to be cut. The torch with the three changeable tips can cut thicknesses from 3 to 50 mm which is the normal working range for the cutting of shapes. This range can be extended to 80 mm for straight and circular cutting by means of a fourth tip.

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In all the working operations the machine moves without any special means along the surface of the material to be cut. For straight cutting it is fitted out with two lead rollers on the side which are placed on a lead rail made of a conventional L shaped profile 35 x 35 mm in size. For circular cutting the machine has a compass with a heavy point. The arm of the compass is fixed to the castings of the gear box. The fine adjustment of the torch to the exact diameter of the circle is done by means of the side support of the machine.

The torch is connected to the high speed stem on the upper part of the handle by means of a metal plated base of a small diameter. The high speed stem serves as a terminal of the connecting leads and divides the oxygen for the preheating and for the cutting. The high speed stem is controlled by two pushbuttons which are built into the handle, and has a valve which regulates the quality of the flame. The use of this type of high speed stem narrows down the servicing to the switching on and off of the pushbuttons once the quality of the flame has been adjusted. This makes the handling at the start and finish of the cutting operation much easier.

The control elements of the machine are suitably placed about the handle so that the machine can be controlled during operation by the right hand alone, which can switch the motor on and off, regulate the travel speed, regulate the clutch and pushbuttons of the high speed stem without changing position.

So far experience has shown that the R S O Mikron fulfills all the exacting conditions and is a miniature machine of great capability and output. Thanks to its small size, it can be placed into an attaché case. This useful machine for construction and finishing oxygen cutting can be seen in the stand of STROJEXPORT, its sole exporter.

# Type FB 50 V Vertical Milling Machine.

The Vertical Milling Machine type FB 50 V exhibited at the Strojexport stand at the III Czechoslovak Engineering Exhibition in Brno, is a further type which completes the series of Milling Machines produced in and exported under the trade mark "Zbrojovka" to practically all countries in the world.

This milling machine is intended for the milling of plane surfaces of non-ferrous metals and their alloys, soft and hard steels, cast iron parts, etc. In addition to the standard equipment the machine has a number of important features, among which should be mentioned:

the cushioning of torsion vibrations of the spindle by an excenter and a special brake, working speeds are infinitely variable in the entire range (from 12 to 1200 r.p.m.) the fine feeds are decreased by 50% in relation to the working feeds - coupling of spindle speeds in 18 steps in range 28 - 1400 r.p.m. is automatic.

The ideal design of this Vertical Milling Machine considerably simplifies the operation of the machine, the functions of which can be controlled from the suspended control panel.

The table can be set up into the working position without any hand manipulation according to the dividing rings. Tightening of the bracket and cross slides as well as the lowering of the bracket during traverse speed /by 0,5 mm/ is automatic. The machine, which is accommodated for an automatic working cycle is remarkable for its overall sturdiness of construction and driving mechanism. In addition to the ample standard accessories the Vertical Milling Machine can be equipped with special devices, such as a swivelling mechanical table, etc.

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## Specification of the most important technical data:

Clamping table surface: width	mm	500
length	mm	2000
T- slots: number		3
width	mm	22
Distance between T-slots	mm	110
Longitudinal table feed	mm	1250
Cross table feed	mm	450
Vertical table feed	mm	500
Spindle speeds: number		18
range		28 - 1400 r.p.m.
Feeds: infinitely variable in longitudinal, cross and vertical direction in range	mm	11 - 1200
Rapid traverse: longitudinal and cross	mm	2600
vertical	mm	625
Electric motor for spindle drive:		
speeds	r.p.m.	1460
output	kW	30

The sole exporter of machine tools is the foreign trade corporation of Strojexport.

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### The Type BUA 31 Universal Grinding Machine.

Another novel machine in the field of machine tools, the type BUA 31 universal grinding machine with automatic working cycle, is being shown by the Czechoslovak engineering industry at the Third Exhibition of Czechoslovak Engineering in Brno. The cleverly conceived design of this machine offers, apart from improved manipulation, a considerable increase of the productive output of operations, while limiting the operator's work practically to clamping of the work-piece in the chuck and subsequent removal of the work-piece from the machine once the machining process is terminated. This up-to-date machine for mass-production is designed for the grinding of external cylinder and taper surfaces, and for the grinding of holes and planes with the work-head turned by 90°.

Grinding can be performed by the longitudinal or by the recessing method with automatic feed of the wheel-head.

The problem of fine feeds has been solved on this machine by guiding the wheel-head on rollers. One of the guide tracks is flat, the other prismatic. Between both housings rollers of the highest precision, in appropriate cages, have been inserted in both guide tracks. On this grinding machine, which operates in an automatic working cycle, it is possible not only to pre-select the extent of the feed in roughing and smoothing operations, but also the time of the cessation of sparking and of the dwells at the end of the

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stroke. The machine is also provided with equipment for semi-automatic equilibration of the wheel during operation of the machine.

Suitable supplementary attachments for these series BUA grinding machines are micrometric tracing gauges /type IMJ 18 - IMK 25 or IMJ 25/ for checking the precision of the grinding process in accordance with a template or a prototype of the proposed work-piece during operation of the machine, and for announcing by an electric impulse the termination of the automatic cycle. This gauging equipment can be adjusted with a precision of 0.001 mm.

The type BUA 31 universal grinding machine which, due to its design incorporating the latest technical ideas, constitutes a further step towards automation in production, is exported exclusively by the foreign trade corporation of STROJEXPORT, PRAGUE.

#### Standardized Crane Trolleys.

Any works newly provided with up-to-date plant has to count among its equipment also cranes which, while modern in appearance to match the new equipment, are also economic and reliable in operation to an extent which would satisfy the most exacting demands, yet do not require excessive care in maintenance and operation. The new standardized crane trolleys manufactured in Czechoslovakia will meet all these requirements. These crane trolleys can be supplied for the following carrying capacities:

5 tons, 8 tons, 12.5 tons, 20.5 tons, 32.5 tons and 50.8 tons. Due to excellent workmanship, their high efficiency and low weight, their small dimensions and travel limits, the standardized crane trolleys will give a fully satisfactory performance even in heaviest duty operations.

The overall conception of design corresponds to the standardization of crane trolleys introduced in Soviet Russia and in the People's Democracies / in the Polish People's Republic and in the German Democratic Republic/. Through the use of hardened gear teeth and of built-in equipment for the control of hoisting speed a reduction of overall weight together with a lengthened service life of the machines and more favourable working conditions have been achieved.

In their design and workmanship these typified crane trolleys are up to world standards. The hoisting gear transmissions with their helical hardened and ground teeth are seated in a box filled with oil which makes for a minimum of maintenance requirements. The use of anti-friction bearings at all seatings increases the efficiency of the machinery and reduces the consumption of lubricants. Motor and gear box are connected by flexible claw couplings whose service life will exceed in length many times that of the old design. This arrangement facilitates also dismantling during operations and keep distortions by load from being transmitted to the machine. The cable drum is connected with the gear transmission by a flexible claw coupling as well.

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The drum can be dismantled without opening the gear box. The shoe brakes are of block design and operate very smoothly due to the hydraulic release of the brake shoes. The brake discs have hardened surfaces ensuring long service life. The brake pins are also hardened and they are seated in hardened steel bushings. When starting up as well as when shutting down operations the hoisting speed may be reduced to one fifth the top speed, a procedure preventing impacts during work and facilitating binding and adjustment of load. In this way also the years of useful service of the entire crane will be extended considerably.

All the transmission gears, not only of the hoisting mechanism but of the crane trolley travelling mechanism as well, are boxed and seated in an oil bath and all seatings are provided with anti-friction bearings. The travel wheels are turning in corner bearing box shells with anti-friction bearings, an arrangement which makes assembly and dismantling of the travel wheels during operations easy. The shoe brake with a short-lift magnet of reliable performance permits a smooth stopping. And the overall mechanical arrangement makes for a small structural overall length of the crane trolley. Spring-loaded shock-absorbers seated in the centre of the longitudinal frame girders will soften shocks adequately without increasing the structural overall length of the unit.

It is possible to build into the crane trolleys a mechanical safety device against overloading, which will automatically switch off the current in case heavier burdens are lifted than the maximum safe loading limits permit.

The lower cable sheaves and the upper pulley blocks are also running in anti-friction bearings. They as well as the axle may be dismantled easily during operations. The lower pulley blocks have a low overall height. In case of a defect of the hook in the part below the thread the hook will catch by means

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the stroke of all contacts can be varied by turning the auxiliary eccentric shaft with an oil regulator.

The main eccentric shaft is driven from an induction motor supplied with direct current to the rotor. The box is located on a frame with spring-mounted rubber interconnecting links; lubrication is effected by spraying oil by means of eccenters. The box is provided with inspection holes which permit observation of the operation of the mechanism and checking of the condition of the contacts.

Electrolysis contact rectifiers find a wide field of application in the chemical and metallurgical industries. Due to their high economy in operation they are likely to replace all other types of rectifiers in the next few years.

Their sole exporter is the foreign trade corporation of STROJEXPORT, Prague.

# Unit-Head Machine Tools - Multiply Production Output

## Manifold !

The present-day Czechoslovak production widely uses machine tools of ever increasing efficiency on which the greatest possible number of machining operations can be performed on the workpiece without having to remove it from the chuck. Among these machine tools pride of place is due, no doubt, to the UNIT-HEAD MACHINE TOOLS which may be combined in a most economic and efficient way from sundry standard machine-tool units to suit the task in hand. There are quite a number of such machine-tool units and standard assembly elements available, such as, for instance, drilling units, boring units, milling units as well as turning and facing units, furthermore feeding, driving and chucking units, standard plates and tables supplemented by special accessory parts and so forth.

Visitors to this year's Third Exhibition of Czechoslovak Engineering in Brno will be able to judge for themselves the standard of quality of the unit-head machine tools - on show at the stand of the foreign trade corporation STROJEXPORT /of Prague/ who exports such machine tools in an ever growing number even to those countries where the production of this particular line is on a high level.

A novelty of Czechoslovak manufacture on show is the type 77073 unit-head machine tool for machining front wheel hubs. The machine drills, chamfers edges, rough-

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machines and cuts threads. Operating in automatic working cycles, this machine tool can produce approximately 700 pieces per working shift. The chucks for clamping by hand are arranged on a revolving drum. This drum revolves and locks positions by hydraulic force. Another machine tool displayed at the exposition is the type 77077 UNIT-HEAD MACHINE TOOL designed for machining gear box rear covers. The machine is of quadrilateral design. The vertical drilling unit has a drilling head with six spindles. Chucking on this machine is done by pneumatic action. During one working shift this machine produces up to 350 motor-cycle gear boxes of first-rate machining /It drills sixteen holes and taps them inside with the thread necessary for the bolts/. The operation of these unit-head machine tools is exceedingly simple and requires no special knowledge. The job of the operator consists practically only of clamping the work-piece into the chucks, setting the machine in operation and of removing the work-piece once the machining process is terminated. The machine performance is absolutely reliable and - above all - the production output on these machines is many times higher than that achieved by the old method of machining parts on several individual machine tools. The foreign trade corporation of STROJEXPORT - PRAGUE, is exclusively in charge of the export of these machine tools.

Electric bridge crane of 50/8t capacity and 22.4 m span.

The electric bridge crane of 50/8 t capacity and 22,4 m span belongs to the typified range of 5 - 50t capacity cranes, with 10.8 to 28.8 m span.

With its constructional features it places itself in line with typified cranes of the USSR and the People's democracies. By use of hardened teeth, hydro-electric braking units, regulation of hoisting speed and unit construction of the bridge's traveling mechanism, minimum working weight as well as an increase in life and more favourable working conditions have been achieved.

The whole crane is carefully manufactured and with its constructional features reaches world standard.

Reduction gears are placed in oil filled boxes and require little maintenance. The introduction of roller bearings into all casings increases efficiency of the whole mechanism and lowers consumption of current and lubricants. Since earlier used flexible couplings with leather or rubber rollers have been substituted by flexible claw-couplings, the life of couplings has been prolonged several times, - it facilitates mounting and dismantling during operation and does not transmit deflection created by load into machinery.

Electro-hydraulically controlled jaw brakes of the unit construction are acting softly and prevent shocks at the start and stop.

The traveling mechanism of the bridge is of unit construction. The through-going mechanical shaft has been substituted by electrical shaft, which does not transmit vibration into the whole construction /any deflection of the construction due to load has no influence upon silent and smooth running of machine/.

All gears of the bridge's travelling device are also placed in boxes. All mountings /in roller bearings/ and traveling wheels /placed in corner bearing housings/ can be easily dismantled during service. Traveling wheels of crab and bridge have their traveling surface hardened in consequence whereof their life is considerably prolonged.

Lattice steel construction of the bridge has been substituted by modern box-type construction which improves the architectonic shape of the crane, reduces its height, building expenses as well as cost of coating.

Cross-trolley conductors on the crane bridge are at the exhibited crane substituted by flexible cables carried over a guide drum. Apart from this new device, remote control from a short-wave transmitter set, operated in the vicinity of the crane, is here used.

#### Main data:

Carrying capacity of main lift .....	50,000 kg
Carrying capacity of auxiliary lift .....	8,000 kg
Span of bridge .....	22,400 mm
Wheel-base of bridge .....	5,400 mm
Lifting height /lift/ .....	16,000 mm

#### Operational speed :

Lifting speed of main lift .....	5 m/min
Lifting speed of auxiliary lift .....	16 m/min
Traveling speed of crab .....	40 m/min
Traveling speed of bridge .....	80 m/min

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## Size of motors :

Lifting motor for main lift 53 kW	25% i.d.	720 RPM
Lifting motor for auxiliary lift 30 kW	25% i.d.	960 RPM
Traveling motor of crab 6 kW	25% i.d.	920 RPM
Traveling bridge, 2 motors 11 kW	25% i.d.	930 RPM

Total weight of complete crane incl. electrical equipment  
49,000 kg

The sole exporter is the foreign trade corporation of Stroj-export - Praha.

## Type M113 Double-spindle Surface Milling Machine

This special machine, exhibited at the Strojexport stand at the III Czechoslovak Engineering Exhibition in Brno, is intended for milling both sides of plane surfaces. The machine can be equally successfully employed in either single or serial production. Special feature of this machine, which is designed as unit head, is the large range of revolutions /28 - 900 r.p.m./ as well as the infinitely variable feeds /20 - 1000 mm/min/ - rapid feed 300 mm/min which permits the use of high speed cutting tools or carbide tipped tools. The milling unit has 16 speeds, which are coupled by a lever situated on the unit.

The push button boxes provided on the milling units ensure simple operation of all main functions. The engaging and disengaging of the spindle headstock sleeve is also push button controlled.

Another feature of this machine is the possibility to set up accurately the spindle headstock sleeve into its original position with the aid of special equipment. It is also possible to set up the range of distance of tool withdrawal from the machined surface. While the axial adjustment of milling units is done manually - the mechanical tightening of the headstock sleeve is push button controlled. The infinitely variable regulation of feeds, with the high revolution range enables the selection of the most convenient cutting conditions.

Components, machined on this double-spindle surface milling machine, type FRE 3 have excellent accuracy and a high quality machined surface.

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## Specifications of the FRE 3 Milling Machine:

Working surface of table .....	mm 800 x 200
T-slots: number .....	5
width x distance between T-slots	22 - 125
Movement of table .....	mm 2000
Transverse of table infinitely variable in extent	mm/min 20 - 1000
Rapid traverse of table	mm/min 3000
Spindle taper	steep 50
Diameter of spindle in front bearing	mm 120
Diameter of spindle headstock sleeve	mm 225
Axial adjustment of spindle	mm 250
Spindle speeds: number	16
range	r.p.m. 28 - 900
Distance: centreline of spindle to table working surface	mm 300
Distance: between spindle noses	mm 250 - 850
Electric motor output	kW 14
Weight of machine approx.	kg 12,000

# Type SN 55 Universal Centre Lathe with hydraulic Copying Attachment.

One of the latest models exhibited at the Strojexport stand at the III Czechoslovak Engineering Exhibition in Brno is the type SN 55 Universal Centre Lathe, which can be used either for single pieces or for mass production. Many varied operations can be performed on this machine. In addition to the normal turning work it is possible, with the aid of additional equipment, to mill gears by means of module cutters, to mill grooves and to turn tapers, face grinding, circumferential and internal can also be performed and drilling and copying by means of a mechanical or hydraulic copying attachment.

One of its main features is its simple operation. The wide range of the above mentioned working possibilities ensures its utility especially in the production of spare parts.

The wide speed range of the spindle, seated in special roller bearings, enables the selection of the most convenient cutting speeds in the entire range of swing. In case the machine is overloaded by taking larger chips, the disengaging clutch reliably functions and not only protects the machine from damage, but when set up to a constant thickness, enables turning to a steady stop in the longitudinal direction. The simple design of the machine and the fact that on this centre lathe it is possible to cut all types of threads /English, Metric, Module and Diametral Pitch/ with the minimum adjustment of gears, ensures its universality.

The machine can be fully equipped with special <sup>as well as</sup> standard accessories.

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## Specification of some technical data:

Swing over bed .....	mm	550
Swing over carriage .....	mm	310
Swing in gap .....	mm	800
Width of gap at the clamping plate .....	mm	300
Distance between centres ..	mm	1000 - 7000
Section of cutting tool ...	mm	40 x 25
Spindle speeds: number ....		16
range	r.p.m.	10 - 1000
Spindle bore: straight-way	mm	Ø 61
in length of 540 mm		
from flange	mm	Ø 72
Dia of tailstock sleeve ...	mm	Ø 90
Longitudinal feeds:		
for the entire speed range	mm/rev	0.05 - 0.8
only for 10 - to 120 rev	mm/rev	0.05 - 6.4
Threads: Metric .....	mm	0.5 - 40
Withworth G/1 ..	threads per 1"	80 + 1
Module .....		0.25 - 20
Diametral Pitch ...	D.P./1"	72 - 2
Electric motor output .....	kW	7.5
Weight of machine including stand, equipment for distance between centres: 100	kg	2630
1500	kg	2760
2000	kg	2880
2500	kg	2910
3000	kg	3030

#### CDK 630 Hydraulic Straightening Press.

Among the many presses of various types and sizes intended for different purposes which are built nowadays in Czechoslovakia, an outstanding position is occupied by the technically as well as commercially improved type of Škoda make, CDK 630 hydraulic straightening press, also displayed at this exhibition.

It will be a good acquisition for every forge and mechanical shop in engineering works while offering wide facilities in straightening shafts, bars, parts of elongated shape, etc.

The press itself is of a vertical design with a C-type frame providing the possibility of travelling on four built-in wheels. The frame cast of steel carries a hydraulic cylinder mounted in its upper part to the bottom of which the cylinder for the idling stroke of the plunger is attached. The lower part of the stand forms a bed with two rests for the object to be straightened. At one side of the frame the drive is located. For traversing along the work piece two pairs of wheels are provided, one of them being driven by an electric motor. The work to be straightened is laid with one end on the fixed rest, the other being placed on a longitudinally adjustable rest /by means of a handle and a chain drive/.

Spring loaded rollers arranged at the upper parts of both bedrests enable easy turning of the work around

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its longitudinal axis. While being turned round, the work is held upwards by the springs in such a manner, that it begins to bear upon the bed-rest faces only after the pressure of the plunger has set in. Only the rollers of the fixed bed-rest are driven by an electric motor. For all electric motors push-button control is provided.

The press itself has a slide valve control gear actuated by a hand lever. Both the plunger stroke and the travel of the press frame are limited <sup>by limit</sup> switches. The height of the idling stroke is adjustable by means of dogs.

The sole exporter of all presses built in Czechoslovakia is the foreign trade corporation of STROJEXPORT - Praha on whose stand you will see the type CDK 630 hydraulic straightening press displayed.

#### Technical Data.

Maximum capacity	600 tons
Operating pressure	60/350 at
Maximum plunger stroke	400 mm
Maximum travel of press frame	6500 mm
Maximum distance of bed-rests	2000 mm
Length of bed	2200 mm
Total input of electric motors	9.5 kW

# Au 8 Universal Automatic Coil Spring Manufacturing Machine

1136C00

Apart from the already produced automatic machines of the Au type for a wire diameter of 0.2 - 3.4 mm, further types are being developed for the working of a maximum diameter of 12 mm. A novelty at this year's engineering exhibition is the Au 8 universal automatic coil spring manufacturing machine. This machine is suitable for producing L.H and R.H pressure coil springs, pressure coil springs with pressed ends, tension coil springs, pressure-tension coil springs, single and double level springs, shaped bowden cables and many other concave and convex shapes etc.

The wire placed on a stand, passes through straightening pulley and is drawn into two pairs of wheels and pushed by a guide into steel forks in which the spring is coiled. The drawing wheels have grooves on their surfaces, which are changed according to the diameter of the wire. An indispensable part of the machine are the tables which enable the perfect adjustment of the machine. According to these tables /in which are given the uncoiled lengths of the springs/ it is possible to adjust the gear box and camshaft. The machine thus adjusted accomplishes all the further operations - such as loading, coiling, shaping or chiselling off the ends - fully automatically, while the number of manufactured products is registered on a five figure counter. The productivity of this automatic machine is unusually high, making it a real asset to every workshop.

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Among the important advantages of the automatic coil spring manufacturing machine are the exceedingly fast and easy adjustment of the coiling device which is the same for R.H. and L.H. coil springs - its fitting out with a private electric crane with a carrying capacity up to 250 kg designed for the loading of the material on to the stand - the complete cleaning of the wire before being placed into the drawing wheels and its oiling in the guide - automatic lubrication of all moving elements and equipment and a cooling device - perfect safeguarding of the machine against dust and all other kinds of dirt and finally its simple servicing, because the electric controls of the machine are concentrated in the front plate of the automat.

A large number of accessories are supplied with the automatic coil spring manufacturing machine. The sole exporter of these efficient machines is the STROJEXPORT - Foreign Trade Corporation, PRAHA, Czechoslovakia.

## Technical Data:

Minimum diameter of wire	mm 3
Maximum diameter of wire	mm 8
Minimum diameter of spring / 5 diameter of wire /	mm 15
Maximum diameter of spring	mm 110
Maximum uncoiled length of spring with automatic cutting	mm 22,000
Output of machine: springs per minute according to the uncoiled length of spring	pieces 1.3 - 60

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Gear box: Output speeds 3

Speeds for uncoiled length of springs 24

Electric motor:

Output kw 7

Rotations rpm 9.30

Weight of machine kg 2400

### The H 63 A Horizontal Boring Machine.

An important place in the export of Czechoslovak machine tools is taken up by drills and boring machines bearing the well-known trade marks SKODA, MAS and TOS. In this group Czechoslovakia produces all the common types of one-spindle vertical bench, column and housing drills, radial drills, drills with adjustable joint spindles, special single-purpose building drills - composed of standard elements for use in multiple production - and last but not least horizontal boring machines with a spindle diameter of 63 to 100 mm of the bench type, and of a floor plate type with a spindle diameter of 125 to 250 mm.

One of these machines which is outstanding on account of its technical priorities - is the exhibited horizontal boring machine of the H 63 A type. On this machine a high precision of dimensions as well as good surface appearance of worked surfaces can be attained by drilling, boring, thread cutting, milling, reaming, face machining of various parts, etc. The spindle speeds are geometrically graded in three rows with 18 degrees of rotation. The spindle and face carriage drives are independent. The advantage of the use of this boring machine is the possibility of machining at either the same or different speeds of the working spindle and work carriage.

The working feeds have 32 grades derived from the work spindle for the longitudinal and transverse table feed, vertical spindle feed and for the engaging feed of the spindle. The tool slides have the same number of feeds. High speed feeds in all directions are independent of the rotations of the work spindle. The 18 feed grades for milling are also independent of the rotations of the spindle.

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The work table, equipped with devices for the adjustment of the position of the table axis to the vertical plane of the spindle and a device for the setting of positions up to 90° by means of an indicator, has a longitudinal, transverse and circular hand or mechanical feed. The setting to the exact height is done by means of a hand wheel.

This machine which can be equipped with a large number of accessories for many operations of piece and multiple production is a part of the export programme of the Foreign Trade Corporation STROJEXPORT - Praha.

#### Interesting technical data:

Diameter of work spindle	mm 63
Taper of spindle	Morse 4
Maximum diameter for boring with work spindle	mm 355
Maximum boring diameter with slide	mm 560
Maximum boring depth by single feed /complete feed/	mm 560/280
Maximum and minimum height of axis above table	mm 0-710
Maximum distance between face carriage and stay	mm 1800
Diameter of face carriage	mm 415
Clamping surface of table	mm 800 x 1000
Spindle speeds:	
Low speed I for face carriage and work spindle	rpm 8-45
Middle speed II for face carriage and work spindle	rpm 31.5-180
High speed III for face carriage and work spindle	rpm 250-1400
Rotations of motor	rpm 1500
Output of motor	hp 5.5
Weight of machine in overseas packing	kg 5360

### LX 1 Automatic Production Line.

The engineering technology as well as the metal working machinery as displayed at this year's - the third Engineering Exhibition at Brno again affords us the possibility to get a definite idea about the technical development in the heavy engineering industry in Czechoslovakia.

Automatic machine tools arranged to form effective production lines as well as unit head machine tools supplemented with interstage operational conveyance, form the core of the exhibition, clearly revealing the trend predominating in all technical development in the engineering production of this country.

The interesting group of automatic machine tools is successfully represented by the LX 1 automatic production line, an efficient unit built for the economic mass production of connecting rods for Diesel engines. The entire operational cycle of the production line including all the partial operations such as boring, drilling, countersinking and thread cutting is fully automatic. To attend the line two operators only are needed, the whole attendance being limited to putting in the blanks and taking out the fully machined parts. The line is provided with push-button control, the push-buttons being located on a control table at the loading point. On this table also the push-buttons for starting

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the individual electric motors as well as the signal lights are situated. An additional safety switch enables the entire production line to be put instantly out of operation.

The automatic production line comprises 12 drilling units, 1 thread cutting unit and several feeding units. The production process is organised in such a manner that always two connecting rods are machined at once at each machining point. The work is clamped by a hydroplastic chuck attached to a plate. The plate is carried successively from one operation to another. At the end of the line the machined parts are taken off the plates, the latter being sent back to the loading point by means of a conveyor. The back travel of the plates takes place only when all operations have been carried out. Hydraulic pumps for the feeding units including the hydraulic control gear are located in the stands. On them the operating units are mounted partly in a vertical and partly in a horizontal arrangement.

Along the centre line of the automatic production line a trough is located intended for the conveying of chips to a collecting vessel. All drilling units are supplied with coolants by a common cooling system. This fully automatic production line is capable of attaining outputs of up to 35 connecting rods per hour.

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The sole exporter of all displayed machine tools is  
the foreign trade corporation of

STROJEXPORT - Praha - Czechoslovakia.

Technical data.

Number of fully machined parts per hour	35
Number of drilling units	13
Power required	60 kW

# LKT 250/160 Crank Drawing Press

Metal machining tools are once more the main pointer of the technical progress of the Czechoslovak heavy engineering industry at this year's engineering exhibition in Brno. In regard to the important and fundamental trend in world-wide technical development in the manufacture of metal machining tools, the first place this year is given to the shaping machines, whose share in the percent of exported Czechoslovak machines grows rapidly larger every year. This fact is the best proof of the technical conception and reliability of machines bearing the trade mark ŠKODA, TOS etc.

One of the novelties in this branch is the L K T 250/160 crank drawing press designed for shallow drawing and shearing work in piece and mass production. It is especially suitable for the drawing of covers, doors, and other motor car body parts, refrigerators, cookers, etc. The LKT double frame crank press with a rated pressure of 250 tons, 200 mm stroke at 13 strokes per minute; has a welded box shaped frame. The cast steel ram, with an upper ejector - is led by two fixed and two adjustable slide bars. The stroke of the ram can be adjusted either by hand or by means of the motor. The disc clutch functionally connected to the hand brake enables the ram to be stopped in any position of the crankshaft. The clutch is situated in the flywheel. The function of the ram is controlled by the adjustment of the ram switch. The controls of the machine are electro-pneumatic /the pressure of the drawing device is 40 tons at 6 atp./. The machine is equipped with a pneumatic safety valve which safeguards against the damaging of the press at overloading. The pneumatic drawing device in the table is completed by

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a hydraulic retaining catch. An oil pump, the drive of which is derived from the press mechanism, provides for the lubrication of the sliding surfaces. The electric equipment is placed in a special box. Apart from the numerous normal accessories, a stroke counter and lighting lamp can be provided as special accessories. The design for the press conforms to the exacting requirements of the present world technique. The sole exporter of all presses manufactured in Czechoslovakia is the Foreign Trade Corporation STROJEXPORT, PRAHA.

## Technical data:

Rated pressure	tons 250
Number of strokes per minute	13
Maximum allowable number of single operation strokes per min.	8
Pressure of drawing device at 6 atp	tons 40
Stroke of drawing device	mm 200
Clear width below guide-ways	mm 1600
Maximum distance of ram from table	mm 1000
Adjustability of ram	mm 100
Area of table	mm 1120 x 1580
Area of ram	mm 1580 x 850
Output of main electric motor	kW 28
Weight of machine	kg 19450
Weight of drawing device	kg 3750
Weight of table plate	kg 1800

### Industrial Chains

Industrial chains have the following advantages: a great range of possible power transmissions or torques with high efficiency of the transmissions presuming correct selection of the type and size of chain; the chains do not slide like belt transmissions; the distance of the axis can be freely chosen; the service life of a chain transmission in the case of correct selection of the type and size of the chain is many years; the mounting and maintenance costs, with small space requirements, are not considerable; the load of the bearings is considerably lower than in the case of belt transmission; chain transmissions allow considerably higher transmission ratios than belt transmission.

In order to give a short summary of the possibilities of application of industrial chains it is necessary to mention the principal types and their characteristic properties specifying some examples of their application.

Gall chains consist of pins recessed on both sides which have on both ends alternately slid on inner and outer bands. To one chain link there are two to ten bands, according to the size of the chain. The pins are riveted over both ends, riveting sometimes being replaced by a washer and split pin. The bands revolve on the pins. These chains are used for the transmission of high powers and small speeds, such as the carrying parts of cranes, hoists, freight elevators, lifting devices, etc.

Transmission chains consist of alternately connected inner and outer links. The bands of the inner links are firmly connected together by steel bushes. The ends of the bushes are firmly pressed into the openings of the inner bands. The pins

outer link. The bands are manufactured of special heat treated steel, enabling their application in very difficult operations as well as those involving impacts without the occurrence of any damage, as the bent bands allow elastic deformation which compensates impacts without damage to the chains. These chains are used mainly for earth drilling sets.

Conveyor chains are either Gall, transmission or roller chains which are fitted either with an extended pin or lug on the band enabling fastening of a carrying bar or a carrier.

Ewart's chains have links of malleable cast iron, one side of the links forming the pin and the outer side of the links a hooked, opened tube. Of great advantage is the possibility of quick disassembly of the chain by partly turning one link against the other by approximately 90° and by sliding the link in the direction of the pin.

Pin chains are also manufactured of malleable cast iron. They have links one side of which forms a bush into which the pin of the adjoining link is slid. The link itself has the shape of a fork, provided on the other end with openings making possible the insertion of a safety pin against turning and sliding out. Ewart and pin chains are used with advantage in operations carried out under especially difficult conditions /e.g. in dust, clay or steam or in operations involving high temperatures/. The permissible speed of the transmission is approximately 1.5 m per sec. These chains are used also as conveyor chains.

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AUTOMATIC MACHINE FOR MACHINING OF TUBE ENDS FOR  
CONVEYORS.

One of the novelties exhibited at the exposition of STROJEXPORT in the machine tool bay is an automatic machine for the machining of tube ends for conveyors. This high capacity machine is designed for the dressing of the faces and turning of bearing openings of tubes for conveyors. The tubes are machined at both ends at the same time. The working cycle, which is automatic, is controlled by electric relays and electromagnetic valves. The very simple operation of the machine is limited to refilling of tubes in the feeding container. The single-spindle boring units located on both sides of the machine have independent electromotors for the spindle drive. The feed of the spindle sleeve executed with gears and a screw is derived from the spindle drive. The automatic working cycle, including quick feed forwards and backwards, and the working feed, is controlled by adjustable steps. The tubes are clamped by two pneumatic cylinders which control the uniform movements of the two pairs of jaws which face each other. The sole exporter of all machine tools is

STROJEXPORT - PRAHA.

Technical Specification:

Maximum tube diameter	90 mm
Minimum tube diameter	60 mm
Maximum tube length	850 mm
Minimum tube length	240 mm
Working spindle speed	315 r.p.m.
Capacity of boring unit motors	3 kW
Total input of machine	6 kW

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Armoured chains are carrying parts consisting of a row of links reciprocally moving in one plane. Each link consists of one or several bands which fit alternately on the bands of the adjoining link. The links are connected with pins which are riveted over on both ends. Armoured chains are used for transmission of tractive powers when steel cables cannot be used. When the pulling direction is changed, smooth pulleys of a considerably smaller diameter than that permitted for a cable of the same strength are used.

A special group of chains are formed by laminated chains which are used for variators. They enable continuous changing of the transmission ratio,

The sole exporter of these chains is the foreign trade corporation of FERROMET - Praha.

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#### AUTOMATIC MACHINE FOR MACHINING OF TUBE ENDS FOR CONVEYORS.

One of the novelties exhibited at the exposition of STROJEXPORT in the machine tool bay is an automatic machine for the machining of tube ends for conveyors. This high capacity machine is designed for the dressing of the faces and turning of bearing openings of tubes for conveyors. The tubes are machined at both ends at the same time. The working cycle, which is automatic, is controlled by electric relays and electromagnetic valves. The very simple operation of the machine is limited to refilling of tubes in the feeding container. The single-spindle boring units located on both sides of the machine have independent electromotors for the spindle drive. The feed of the spindle sleeve executed with gears and a screw is derived from the spindle drive. The automatic working cycle, including quick feed forwards and backwards, and the working feed, is controlled by adjustable steps. The tubes are clamped by two pneumatic cylinders which control the uniform movements of the two pairs of jaws which face each other. The sole exporter of all machine tools is

STROJEXPORT - PRAHA.

#### Technical Specification:

Maximum tube diameter	90 mm
Minimum tube diameter	60 mm
Maximum tube length	850 mm
Minimum tube length	240 mm
Working spindle speed	315 r.p.m.
Capacity of boring unit motors	3 kW
Total input of machine	6 kW

### The GTP-180/30 Machine for the Pressure Die Casting of Metals

This press whose recommendation is the world famed trade-mark Polák is designed for the manufacture of castings from all type of alloys /zinc, copper, aluminium, brass, magnesium/ weighing from 3 to 5 kg. The maximum die closing force of this box-type press is 180 tons. The parts for the die closing and pressing are situated on a common frame joined by two pillars situated in a tipped plane so that they take up a minimum amount of space from the form. On these pillars is the form carrier supported by brackets with pulleys. This design lowers the amount of wear of the leading sleeves of the carrier to a minimum.

The press is provided with the Polák vertical pressure chamber with a central riser. It is designed for the pressure die casting of metals with a maximum temperature of 1000°C. The molten metal is poured into the chamber by hand- and that with a crucible furnace spoon with a capacity of 100 or 150 kg. The press is also provided with a hydraulic lower ram with serves to shear the remaining metal and throw the cutting back into the chamber. The waste can also be easily removed by hand and returned for further casting. The functioning of the machine is controlled by means of a semi-automatic hydraulic servo-control which enables the setting of the appropriate time interval for the various operations /the pressure time of the closing and pressing rams/. The various functions are at the same time related to each other. With forms without side cores, the ejection of the castings is done automatically by means of impact rods. With the other type of forms with a core the ejecting is done by hand by means of a pinion and a geared rod - or by means of a

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hydraulic ejecting box mounted on the form carrier and independently controlled by means of a special distributor. The servo control with a special hand controlled cam distributor - includes these sub-operations: the closing of the core, the closing of the machine and the stroke of the lower ram, closing with full pressure and pressing /raising of the auxiliary pressure with the multiplier/ - cessation of pressing and lowering the pressure of the multiplier, the shearing of the remaining metal in the chamber, travel of the lower ram from out the chamber, the opening of the core and the removal of the core.

The castings produced by this machine have a smooth clean surface, precise dimensions, good mechanical properties and do not generally require any further working of the surface. The advantage of this modern pressure die casting machine is besides the above mentioned quality of the castings also the high output - 70 - 150 operations per hour according to the type of operation and casting. In addition to that is the simple servicing of the machine, the accessibility of all the elements and the economic and safe operation of the machine. A special accessory designed for the machine is the hydraulic box for the ejecting of castings, the filling set and the core remover. The sole exporter of all presses with the TO3 trade mark, among them this modern machine, manufactured in Czechoslovakia, is the STROJEXPORT Foreign Trade Corporation, PRAHA.

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## Technical Data:

Maximum allowed weigh of metal poured  
into the chamber:

For C U alloys	kg 5.5
For Z n alloys	kg 7.25
For Al alloys	kg 4.07

Maximum allowable area of the casting including  
the runner in the dividing plane of the form:

For C U alloys	cm <sup>2</sup> 270
For Zn alloys	cm <sup>2</sup> 421
For Al alloys	cm <sup>2</sup> 612

Average output per hour according to the casting and alloy operations	70 - 150
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Pressure of operating liquid	kg/cm <sup>2</sup> 180
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Multiplication pressure in the closing ram	kg/cm <sup>2</sup> 260
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Nett weight of the machine about	kg 6000
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# CKV 1000 Hydraulic Forging Press.

The exhibited SKODA CKV 1000 hydraulic forging press ranks among the range of four-column-type forging presses built in Czechoslovakia up to capacity of 12,000 tons. It is suitable for all sorts of forging operations including out-of-centre work, its natural line being the production of medium sized forgings. The machine is driven by pressurized water supplied by an accumulator which can serve for several presses. Its performance is superior to that of the formerly built steam and air forging presses.

The press, fitted with an overhead operating cylinder, has a hydraulic powered system actuating the longitudinal feed of the table and the cross feed of the anvils.

The upper anvil is mounted at the lower end of the operating cylinder for which a movable beam is employed as a guide. Both the upper and the movable beams are of a narrow type, thus providing the facility of easy operation of the cranes used during forging. Due to an efficient control equipment a high number of both working and smoothing strokes is attained. Due to the use of a charging valve by means of which, in the course of the idling stroke, low pressure water is supplied to the press cylinder, high production economy is attained with this press.

The operation of the press is simple and easy. All actions are carried out easily from the operator's

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place, the latter taking up a sitting position. To control the press hydraulic control gears are employed, the most important one having an additional servocontrol. Apart from the standard accessories also a rich selection of special accessories is available.

The sole exporter of forging presses built in Czechoslovakia is the foreign trade corporation of STROJEXPORT - Praha.

## Technical data.

Maximum working capacity	980 t
Maximum press stroke	1250 mm
Size of forging platen	5000 x 1600 mm
Maximum height of press above shop floor	8600 mm
Maximum width of press above shop floor approx.	9800 mm
Maximum length of press above shop floor approx.	14550 mm
Weight of press	250 tons

MAXIMA/VS 14 Bench Line Saw

This saw is designed for accurate cutting off of lines from line composing machines and also cast lines from rods to required lengths in typographic measures. It is light, of small size and of simple construction, being at the same time sufficiently stable in order to ensure reliably the required precision of the cut in a tolerance of  $\pm 15$  thousandths of a millimetre.

Due to its very easy and quick operation the Maxima-VS 14 saw is suitable for every machine and hand type-setting room.

It can be fastened in a simple way to a suitable working bench and connected to the electric mains.

The Maxima-VS 14 line saw consists of a cast iron box and a single-phase electromotor for a voltage of 120-220 V. The sliding table with guide bars runs on precise steel balls. Its movement is easy and in longitudinal direction accurate without the possibility of cross movement. The bars and the table are manufactured of first-class steel, the prismatic ways for the balls are hardened.

On the motor-shaft there is fastened the head with saw blade and three milling cutters which dress the cut lines to a precise length.

The surface of the cut is perfectly smooth and at right angles to the supporting rule with a cicero scale fastened at the front edge of the bench.

The slide which slides on the supporting rule is finely adjusted by the grooved head of the screw of the rule.

Band Grinding and Polishing Machine.

One of the new models exhibited on the Third Exhibition of Czechoslovak Engineering is the type LSP 630 D band grinding and polishing machine for grinding and polishing by free hand. Its sturdy construction and perfect equipment enables the utilisation of the machine for the most intricate and difficult grinding and polishing operations.

The machine operates with a new method of grinding, at present very little used here. It grinds by means of machine-made grinding belts which are stretched by special stretching equipment fitted directly on the machine. Grinding is performed on special discs of dia. 350 or 400 mm, felt or rubber-coated.

Advantages of the type LSP 630 - D grinding machines:

1. The use of a 3 m long band increases the grinding area more than three times in comparison with felt or emery grinding wheels.
2. The grinding belt, machine made, is provided with a uniform layer of abrasive /specified grains with minimum consumption of abrasive/.
3. The grinding belt eliminates slow, uneconomic and inaccurate manual rolling of abrasives on the grinding wheel.
4. The strip stretched between the disc and the stretching rollers has suitable conditions for cooling and conducting heat caused during the grinding operation.
5. Due to the above mentioned advantages the quality of the ground surface is considerably increased.
6. The new method of grinding represents a 30% saving in grinding costs compared with the costs of grinding operations effected with glued emery wheels.

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7. The machine has two independently driven grinding spindles with the possibility of speed regulation within the ranges of 1380, 1550, 1705 and 2000 rpm. Each spindle is driven by an independent electric motor controlled by a switch. The machine may be successfully employed in all cases where variation of the spindle speed is essential.
8. The considerable extension of the wheels enables the grinding of components with parts which are difficult to reach.

#### Description of the machine:

The machine has sturdy box type stand, shifted considerably forward. On the sides there are flanges for fitting the driving electric motor. The inside of the box is arranged to accommodate the electrical equipment of the machine. The flange electric motors are fitted on adjustable flanges with V-belt stretching equipment. The V-belts are stretched from inside by means of hand wheels. The machine spindles are seated in strong roller bearings placed in cast iron arms. The torque is transmitted by V-belts from the motor to the spindles. To enable easy shifting of the belts, the stand is provided on top with a removable cover. On the front of the stand there are situated the motor switches, the machine lighting switch and the electrical equipment cover. The machine is lit by 24 V supplied from the transmission transformer built-in into the machine. The machine is equipped with 2 lights, 60 W, thus ensuring sufficient light for the operator to see the set-up workplace. For belt grinding the machine is equipped with a stretching attachment with adjustable spring cushioned stretching rollers. Each spindle has an independent stretching roller fitted on a bracket which, by means of the chucking plate, is fitted on to the spindle arm. The belt cover is also fitted

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to the chucking plate. The machine is equipped with extensions and centres for which the spindle is provided with threaded holes and two contact wheels.

#### Specifications

Main dimensions of machine	1045 x 2070 x 2060 mm high /arm bevel 30°/
Maximum distance from shaft to wheels/	shaft /towards centre of 1800 mm
Maximum displacement from shaft to shaft /towards centre of wheels/	670 mm
Height of spindle above floor	1000 mm
Dia. of shaft	45 mm
Maximum dia x width of wheel	400 x 120 mm
Grinding band /length x width/	3000 x 120 mm
Spindle speeds	1380, 1560, 1705, 2000 r.p.m.
Electric motors	47 n-2, H7, 380 660 V 2880 r.p.m.
Tension	380 220 V, 50
Machine lighting	2 x 60 W, 24 V
Weight of machine	850 kg.

For easier grinding and polishing conditions the other exhibited machine, the type ULSP 315, should be used. This is also arranged for the possibility of band grinding. The spindles of this machine are driven by one common electric motor. The maximum dia of the wheels used is 300 mm and the maximum width 120 mm.

Automation and Mechanization - the Requirements of  
Up-To-Date Production Methods.

Czechoslovakia's crude-oil engine industry has made its contribution to the progressing trend towards automation and mechanization of production processes, intended to reduce physical toil in all fields of human endeavour, in the form of automatically controlled Diesel-electric sets which, due to their reliability and technical perfection, will certainly be received with appreciation and proper recognition. One of the series of efficient 16 to 150 kVA sets now in preparation is a Diesel-electric set with an output of 100 and 150 kVA respectively, equipped with a type 6 S 160 crude-oil engine with an output of 135 and 180 H.P. at 750 and 1,000 r.p.m. respectively. The re-designed crude-oil engine whose fuel consumption has been brought down to a low 172 grammes /H.P./ hour is equipped with all the necessary gear which falls into three groups, as listed below:

- 1/ The starting gear,
- 2/ Apparatus signalling any unsafe condition of the engine,
- 3/ A device for stopping the engine as soon as electric current is supplied by the public service system or in the case of a failure in the set.

In view of the fact that this unit is equipped with pneumatic starting gear, the air tank is provided with a starting valve controlled by an electro-magnet which

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is supplied over a relay. This relay transmits an impulse for starting when the tension in the mains is fully lost, or even when this happens in one phase only of the respective electric circuit. As soon as the electro-magnet, which is connected to a storage battery, opens the starting valve the compressed air issuing from the tank starts the engine running in the usual way. Once an adequate starting speed has been reached the power supply to the electro-magnet is cut off by the action of an ALNICO-type apparatus and the feeding of compressed air to the engine is interrupted in this way as well. If the first starting operation turns out to be unsuccessful, it is repeated after a short interval by the action of a special time-lag relay which operates a maximum of three times in succession. As soon as the required operating speed has been achieved as well as the full alternator voltage, which is controlled by a no-voltage relay, the latter relay connects the alternator to the circuit which is to be supplied. Forty seconds after the starting a signalling device is set into operation by a checking relay. Within this period the minimum required fuel oil pressure, checked by a pressure switch, should have been reached. If the preset value of oil pressure is not attained within these forty seconds, the engine is stopped by automatic action, the failure being signalled by a red light signal and by the sound of a hooter. Should the rated temperatures of the oil or cooling water be ex-

ceeded during operation, the first contacts of the checking thermometers announce the failure by a red signal light on the control panel and audibly, by a hooter. If the defect is not rectified and the temperatures continues to rise further contacts are closed. A stopping magnet controlled by a relay which reacts upon impulses emitted by the contact thermometers then cuts off any further fuel supply and the engine comes to a standstill. In a similar way, however, without previous warning signals, the engine is stopped if the oil pressure drops during operation. Before the fuel supply is cut off the alternator is disconnected from the circuit it is supplying. A red light on the control panel indicates in which one of the checked circuits the failure has occurred. When the supply of electric power from the public mains is resumed the contacts of the generator contactor are automatically disconnected from the supplied circuit and, after a slight delay, the contactors connecting the public mains to the supplied circuit are connected. The stopping magnet controlled by the respective relay cuts off the fuel supply and puts the engine out of operation which, without the necessity of any action on the part of the operator, is again prepared for further operation in the case of a further interruption of the power supply from the public mains.

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The compressed-air tank supplying the pressure air for starting is re-filled by a compressor which is operated by an electric motor. The head of the compressed-air bottle is provided with a contact pressure gauge with contacts adjustable for minimum and maximum air pressure. If the air pressure drops below the pre-set minimum for air pressure the contacts close the power circuit and the switch connects the electric motor to the mains. When the electric motor has started to operate the compressed-air supply in the air bottle is replenished until the air pressure reaches the maximum value pre-set on the contact pressure gauge. Once this has been achieved the contacts for maximum pressure close the power circuit and the contactor interrupts the supply of power to the electric motor. If the compressor is cooled by flowing water the valve for the feeding of cooling water is at the same time opened and closed.

The switchboard used on these sets is provided with a panel for signalization of dangerous conditions of the engine, with the appropriate relays and with instruments for starting, stopping and so forth. The control panel of the generator is equipped with three ammeters, a voltmeter, a kilo-watt hour meter, a power-factor meter, a frequency meter, a protective switch and all further instruments required for safe operation and for checking the generator operation. Another panel contains the requisite contactors.

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In producing this equipment the Czechoslovak industry has scored another valuable success, bearing out the fact that the industry has an adequate number of highly trained technical engineers and workers who are not only a match for foreign competition, but are able to outstrip it in many ways.

The exclusive exporter of all engines on show at the Third Exhibition of Czechoslovak Engineering in Brno and which can be seen there in operation, is the firm of S T R O J - E X P O R T - P R A G U E.

### Machines Whose Products Make Life More Agreeable!

Yes - right from the moment of awakening in the morning we all use certain simple objects which make life more comfortable. Quite a number of these is produced of thermo-plastic materials and it is hard to imagine the life of present-day man without them. Another indisputable fact is that the products made of these materials are frequently superior and more serviceable in many ways than the same products made of china, glass or fine metals. Those who are interested in the question of how such products of plastics are made and what the machines that make them look like will find the answer to that at this year's Third Exhibition of Czechoslovak Engineering in Brno at the stand of the foreign trade corporation of S T R O J E X P O R T, of Prague, where two such machines, incorporating the very latest ideas of engineering practice in that line, are being shown in actual operation.

The type CSB 12.4.5 hydraulic injection press for thermo-plastic material is the smallest semi-automatic press of angular design for the injection of thermo-plastic materials into the parting line of the mould. The closing force is 12 tons, the pressing force 4.5 tons, the maximum mould dimensions are 140 by 220 mm and the operating pressure is 150 atms. The machine can handle pressings of a weight of up to 35 grammes. The injection process is exceedingly simple. All motions are controlled by one single lever. The provided safety features exclude any possible accident. A hydraulic set

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serves as operating agent. An absolute novelty in the field of Czechoslovak presses is the fully automatic injection press for the injection of thermo-plastic materials with a maximum die closing power of 85 tons, a withdrawing force of 8 tons, an ejection force of 8 tons and an injection force of 21 tons. The machine can handle pressings of up to a maximum weight of 100 grammes. Its operating pressure is 160 atms. In accordance with the position of the injection cylinder it is possible to inject the material either perpendicular to the parting of the mould /to the centre line/ - or directly into the parting line of the mould/into the joint/.

The design of all hydraulic presses of Czechoslovak manufacture ensures economic operation, maximum trouble-free performance and 100 % utilisation of the machine capacity with perfect safety of the working processes. All kinds of thermo-plastic materials can be handled in these presses, such as polyamide, polyethylene, acetate, polyvinyl chloride, or polystyrene. Production on these machines leaves no waste material, since gates, protuberances and possible defective pressings retain their full value as pressing material and may be used again. Articles produced on these presses of Czechoslovak manufacture are attractive-looking, extremely durable and wear-resistant.

The service-tested trade-mark of T O S carried by these hydraulic injection presses is a recommendation in itself. The foreign trade corporation of S T R O J E X P O R T - P R A G U E, is exclusively in charge of the export of these machines.

## Type F V S 16 Vertical Milling Machine

One of the machines meeting the requirements for machines for up-to-date machining is the type FVS 16 Vertical Milling Machine - exhibited at the Strojexport stand at the III Czechoslovak Engineering Exhibition in Brno. This machine is intended for efficient and accurate machining of heavy workpieces up to 75 kg in weight. The great range of spindle speeds and table feeds allows for the economic utilisation of carbide tipped tools. Simplified servicing during mass production makes it possible for the machine to be set up for an entire automatical cycle i.e. by employing the machine feeds and rapid feeds, and reverse rapid table traverse.

A single lever engages the automatic cycle, also the feeds and rapid feeds in both directions - the feeds are coupled by two levers.

The machine is switched over by electromagnetic couplings controlled by adjustable stops.

An independent electric motor drives the machine feeds and rapid feed, the spindle is also driven by an independent electric motor.

The spindle, seated in a double row roller bearing and provided with an eccentric, is started and stopped by push buttons. The vertical spindle motion is manual. The headstock can also be manually adjusted in the cross direction.

The machine is equipped with an independent electric pump for cooling equipment. There is circulation lubrication of the feed box, screw and gear box. The accuracy, simple servicing and high output of the type FVS 16 Vertical Milling Machine which is fully equipped with standard and special accessories makes it extremely valuable for all industrial production.

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Specification of the most interesting technical data of the machine:

Table clamping surface .....	mm	160 x 630
Clamping T-slots: number		3
	width x distance between T-slots	mm
		14 x 45
Longitudinal table feed: hand	mm	350
	machine	mm
		340
Taper in spindle - steep		30
Distance - spindle nose to table ....	max. mm	225
	min. mm	75
Vertical spindle feed - by hand	mm	150
Cross spindle feed: by hand	mm	200
Spindle speeds: number		9
range	r.p.m.	125 - 2000
Longitudinal table speed:		
number		10
normal - range	mm/min	11.2 - 250
rapid feed	mm/min	1800
increased range	mm/min	22.4 - 500
rapid feed		3600
Electric motor for spindle drive: speed	r.p.m.	1400
output	kW	1.5
Electric motor for feeds: speed	r.p.m.	890
output	kW	0.3
Weight of machine incl. standard equipment	kg	800

Sole exporter of machine tools is the foreign trade corporation of STROJEXPORT.

Lathes which are in use all over the World.

The Czechoslovak machine tools of SKODA, Zbrojovka, Volman, TOS, MAS Kamenický trade-marks, etc. have, with their quality and technical perfection, won a good reputation on all world markets. One of the machine tools which have become popular and for which there is a continuously increasing demand in a large number of countries in all parts of the world is the type SV 18 R lathe.

The type SV 18 R Universal lathe is a high speed lathe with universal use in repair shops as well as in greater production factories. The machine, which is exhibited in operation, is equipped with a type KZ 15 hydro-copying attachment which enables the most accurate finishing operations. This equipment not only enables accurate machining of complicated and variously shaped components, but also simultaneously increases the productivity of work. The features of the machine are its universality and great range of speeds /14 - 2800 rpm./ The swing over bed is 380 mm, the stroke of the copying attachment carriage 60 mm and the distance between the centres 1000 mm.

The Centre Lathe SU 63 A. In the design of the lathes of the SU series a number of new ideas are applied which increase its accuracy, speed up operation and simplify servicing. The considerable input of the driving motors and the range of speeds and feeds enable full use of carbide tipped tools. The SU 63 centre lathe is intended for single pieces as well as for serial mass production of workpieces up to a weight of 6000 kg. The type IKS 3 hydraulic copying attachment /longitudinal or cross/ enables the copying of various shaped workpieces. The lathes of the SU series are equipped with special stop boxes which enable accurate disengaging of the automatic feed. These stops have made famous the SUR - SKODA lathes disengaging boxes. This is one of the best lathes in the world. The swing over bed of the SU 63 is 630 mm, the distance between the centres 2750 mm, the swing over carriage

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360 mm and the number of longitudinal and cross feeds 40.

The type SPE 50 semi-automatic lathe is intended for the turning of machinery parts of medium size in serial or single-piece production. The main feature of this machine is the possibility of turning simultaneously by two barriages on the outer and inner surface of the chucked workpiece. The machine may also be equipped with a hydraulic copying attachment. The machine has 12 spindle speeds ranging from 54 - 512 rpm. The swing over bed is 500 mm, the maximum distance between the centres being 300 mm.

The exclusive exporters of these machines is Strojexport, Praha.

# CHK 160 - 1 Semi-Automatic Hydraulic Press

The leading slogan of world production is to raise the manufacture of plastic materials and so overcome the shortage of non-ferrous metals. Products of these materials are growing more and more popular with the customers - not only on account of their cheapness, but also because of their durability and quality. The manufacture of presses in Czechoslovakia is also guided by this slogan and demand. The best proof is that these machines bearing the TOS trade mark are installed in plants the world over.

A novelty is the exhibited CBA 160-1 semi-automatic hydraulic press which is designed for the manufacture of stamping from materials that can be heat hardened such as bakelite, melanine, carbamide, rubber etc. The process of manufacture is either by injecting the molten material into heated forms - or by pressing in a form by hydraulic stamping. Certain thermoplastic materials can be also processed in the forms by means of a heating head /supplied as a special accessory to the machine/.

The press, driven by a separated independent motor with pressure switching, has a welded frame equipped with an adjustable prismatic lead for the press plate. In the upper part of the frame is a closing ram - in the lower part an injecting /stamping/ ram - with an adjustable upper position of the stroke. The function of the closing ram can be regulated and slowed down at the preset position. The stop push enables its stopping in any set position. After attaining a previously adjusted pressure a special device enables the automatic

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airing of the form - up to a sequence of three times. When the full closing pressure is attained the clamping of the form takes place for a period of time controlled by a time relay. After that follows the drawing back. With a pressure, preset in a range from 5-300 atp, the forging is stamped by the lower ram. Safety of work is ensured by a device which prevents the press from being put into motion before the working area is shielded by the appropriate cover.

The servicing of the machine is very simple, so that the operator can work on several machines at the same time. During an automatic working cycle the servicing is limited only to the extraction of the pressing, cleaning of the form and charging of the material. Apart from the normal accessories a large number of further special accessories are being manufactured. The sole exporter of all presses manufactured in Czechoslovakia is the STROJEXPORT, Foreign Trade Corporation, PRAHA.

## Technical Data:

Maximum opening		mm 1000 x 10
Maximum distance between housings		mm 760
Dimensions of table and ram		mm 700 x 200
Maximum stroke of closing ram		mm 500
Adjustable closing force		tons from 80 - 160
Adjustable withdrawing force - relative to the pressing force		tons from 32 - 75
Maximum ram speed:		
descent-low pressure	max. 20 atp	mm/sec. 70
pressure - high pressure	20 - 325 atp	mm/sec. 2
opening - low pressure	max. 20 atp	mm/sec. 70
high pressure	from 20-325 atp	mm/sec. 3,5

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Maximum operating pressure is adjustable	160-325 atp.
Maximum opening of injecting ram	mm 250
Injection - pressing - adjustable	tens 0.5 - 75
Adjustable opening force	tens 0.2 - 28
Maximum speed of ram:	
Injecting : Low pressure max. 20 atp	mm/sec. 80
high pressure from 20-325 atp.	mm/sec. 7
Opening: low pressure max. 20 atp.	mm/sec. 250
high pressure from 15-325 atp.	mm/sec. 20
Maximum adjustable operating opening	160 - 325 atp.
Maximum current for upper and lower heating	Amps 10
Weight of press	about kg 3.500

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### MTZ-8 Tractor Trailed Dung Spreader

This machine, which can be attached to a tractor, will prove most useful for cultivation. It is designed for surface dung spreading and simultaneous hoeing and chiseling of row crops, particularly of beet, as well as for dung feeding and hilling of potatoes. It is also suitable for wide-range spraying of meadows and pastures, as well as for spare dung spreading when preparing seed beds. In addition, it can serve for spraying of tracks and roads of 3.4 metres or 11.15 ft width.

The MTZ-8 Tractor Dung Spreader is fitted to a two-wheel trailer chassis. The tank attached to the spreader frame is shifted forward, being balanced by the hoe and its operator accommodated behind the tank. The hoe can be lifted from the operators' post by means of two hand levers.

**Operation:** Two operators, the tractor driver and the dung spreader operator, are needed for dung spreading and simultaneous hoeing. The dung spreader requires a permanent operator who needs initial training. The main reason for this precaution is the special layout of the hoe; for turning to the left, the steering lever must be moved to the right, and vice versa; contrary to any other hoe sets. The dung spreader should be attached to the tractor by bolting the angle piece of the coupling to the centre hole of the tractor bottom drawbar. The angle piece is provided with several holes enabling the adjustment of the respective distance required for turns on headlands. Prior to starting set the wheel of the dung spreader to a tread corresponding to three times the row spacing when spreading dung to beet and twice the row spacing required for potatoes. When dunging beet, adjust the leaf lifters to a ground clearance of approximately 50 mm or 2".

The six parallelograms for dunging beet can be adjusted by shifting them along the hoe frame according to the row spacing, i.e. to 450 or possibly 480 mm / 1'5.7" or 1'6.9" / in case of sugar beet.

Adjust the position of the shovels with both the hoe and the parallelograms in working position. Attach three tools for each row: Two flat-cut hoe shovels and one dung spreading "A" type shovel. Adjust equal height of the cutting edges of all three shovels. The working depth of the hoe is controlled by a wheel running before the shovels along an unhoed interrow. The shovels should be set so as to be placed below the bottom edge of the wheel by the required depth.

For chiseling, replace the dung shovels with dung chisels, which should be set to a greater working depth than the simultaneously attached flat-cut hoe-shovels. Special liners should be inserted into the clips.

In the field enter the rows without stopping, and, while steering the dung spreader with the left hand, unlock the latches with the right foot and lower the hoe units into working position with the right hand. The lower the shovels into the soil by operating the other lever.

When first entering the rows check the correct setting of the parallelograms, the shovels and the leaf lifters.

For dunging, use either dung water alone or diluted with water, or possibly some fertilizer solution. The dung water is supplied from the tank through two cocks with horizontal valve cones and six hoses to the dung shovels or chisels and to the soil. Fill the bowl of the levelmark with water, preferably coloured water for better visibility. Be sure the tank is perfectly airtight prior to starting the machine.

POOR ORIGINAL



### Liquid Egg Tubular Pasteurizing Plant

Liquid eggs are normally used in a frozen state or as a rawmaterial of drying.

It has been ascertained that in breaking eggs bacteriological infection occurs due to contamination of the shell surface and tools even if maximum care is devoted to sanitation. Since the breaking of eggs is carried out at a temperature which is suitable for the growth of bacteria, they rapidly grow in number, thus debasing the quality of the liquid eggs produced. For these reasons and the purpose of utilizing cracked eggs, various methods have been investigated by means of which good quality liquid eggs could be obtained. Numerous tests have shown that a temperature of 60 to 62.5° centigrade is sufficient to destroy the bacteria in liquid eggs at a holding time up to 3 minutes. This temperature is well below 72.5° centigrade at which immediate coagulation is taking place.

As a result of these tests liquid eggs are sometimes pasteurized on plate pasteurizers (used in dairies) especially adapted for this purpose.

A serious drawback of these pasteurizers is the relatively narrow space between the individual plates, for the viscous baked-on deposits of the liquid egg mess together with chalazae (spiral membranes supporting the yolk which floats in the albumen at each end) easily coagulate and stick to the surface of the plates, thus clogging the passage between the plates. Moreover, the pasteurizer cannot be chemically

cleaned but must be dismantled and carefully cleaned by hand. STAT

For these reasons the newly developed Czechoslovak pasteurizer for liquid egg processing which is tubular in shape, seems to be the most suitable. This pasteurizer is provided with adequate passages which permit trouble-free operation and avoid clogging. Even if the passages are partially baked-on, they are of ample size to allow continuous operation of the machine. The pasteurizer is also easy to dismantle at short notice which is of considerable advantage. Adequate and uniform preheating of the egg liquid has been ascertained by various tests. The pasteurizer is cleaned chemically and need not be disassembled.

Egg-whipping and baking tests have also given excellent results. The practical utility of this pasteurizer has been demonstrated by numerous shake-down tests.

#### Description

To-day, standard types of tubular pasteurizers are built in Czechoslovakia with a capacity of 1000 kg of egg liquid per hour which corresponds to that of the respective egg breaking lines. Pasteurizers of lower or higher capacities are, however, also available.

#### Specifications

Capacity: 1000 kg per hour. The egg liquid is heated from 10 to 65° centigrade by means of hot water of about 5° centigrade above pasteurizing temperature.

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Heat regeneration: 60 p.c. Holding time: 1-2-3 minutes.  
Cooling by spring or ice water down to a temperature of 5° centigrade above zero.

Steam and water requirements:

Approximate quantity of steam consumed: 48 kg per hour  
Approximate quantity of spring water required: 2.5-times  
the quantity of the egg liquid  
Approximate quantity of ice water required: 3-times the  
quantity of the egg liquid

The pasteurizer consists of two independent parts: The heating section including regenerating equipment, pasteurizer proper and 3 heat holders (for a holding time of 1 minute each), and the cooling section which incorporates a water cooler and an ice-water cooler.

Each section is provided with a stainless guard, and mounted on a tubular stand.

The pasteurizer and coolers consist of a nest of stainless tubes in a common steel pipe through which the hot and cooling water flows. Heat transmission is increased by means of special insertions which are mounted in the steel pipes so that a turbulent stream is obtained. The liquid egg mass is conducted from one tube to another by means of transfer channels in stainless covers which are held fast by four screws and rubber sealed.

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The regenerating equipment is arranged similarly; it is however, provided with larger diameter tubes in which inner tubes, resembling those of the pasteurizer and cooler, are loosely inserted. The pasteurized liquid egg mass passes through the inner tubes while the non-pasteurized liquid egg mass flows through the annular space between the tubes. The pasteurized liquid egg mass is delivered from one tube to another in the same way as in the pasteurizer; the non-pasteurized liquid egg mass is conducted through channels in the steel pipe bottom. A specially arranged double rubber sealing prevents the pasteurized and non-pasteurized egg liquids from being mixed up.

The three heat holders are tubular in shape and designed for a holding time of 1 minute each. By means of cocks they can be connected in tandem according to the holding time required. A special arrangement of the inner tubes ensures that the liquid is kept in the heat holder for a period of 1 minute.

All parts of the pasteurizing plant which are in contact with the liquid egg mass, are made of stainless steel.

The water is heated by steam in the boiler. A centrifugal pump ensures the circulation of hot water.

The pasteurizer is provided with a registration thermometer, automatic steam governor and self-acting by-pass valve which returns the non-pasteurized mass into the pump funnel. The liquid mass is strained through the pasteurizer and

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partially homogenized by means of a stainless gear pump. A by-pass device provided with a regulating cock serves for the regulation of the amount delivered.

To ensure continuous operation of the machine the pump is fitted with a double cleaner which both retains membranes and cuts chalazae that have passed through. If one cleaner is clogged, another cleaner can be connected by changing over the three-way cocks. In the meantime the former is dismantled and cleaned, and vice versa.

The various points stated above and confirmed by numerous tests demonstrate conclusively the special advantages offered by this liquid egg pasteurizing plant which gives a maximum of pasteurizing efficiency as well as long trouble-free service, is easy to clean, dismantle, etc.

This novelty can be inspected at the STROJEXPORT stand.



### Beet Diggers

In compliance with the requirements of modern agrotechnics the Czechoslovak industry builds machines the application of which ensures the highest soil yields with maximum economy of time, money and human labour.

At the Third Exhibition of Czechoslovak Engineering in Brno a number of farm machines of interesting design can be seen. Whether they be mounted ploughs, cultivators, hillers, hoers, etc., the majority of them stir the interest of both experts and practical users. One of the exhibits of this type is the VRN 3 mounted beet digger. It digs three rows using one RH point and two LH points, while the width of the dug rows can be adjusted from 40 to 50 cm or from 15.75" to 19.68".

A variation of this machine is the VRZ 3 trailing beet digger, actually identical to the VRN 3 digger with the only exception of its being attached to a type ZPN trailing fore-carriage for mounted implements. The weight of the VRN 3 digger is approximately 200 kg or 440 lbs, that of the VRZ 3 digger being approximately 440 kg or 970 lbs. The working width of both machines is 170 cm or 5'7".

An important novelty is the SK 4 four-row tractor potato planter. This is designed for any kind of row-planting of potatoes to a maximum weight of 120 gr. or 4.2 oz per bulb. The row spacing is 62.5 cm or 24.5"; the overall working width being 250 cm or 8'2 2/5". The machine plants potatoes to a depth of 14 to 18 cm or 5.51 to 7.09". The filling capacity of the machine is 2 x 120 kg or 2 x 264.55 lbs of planting material. The machine weighs 950 kg or 2094 lbs, being designed for use with the Zetor 25 tractor.

The sole exporter of these farm machines is MOTOKOV, Foreign Trade Corporation, which supplies not only many European countries (Finland, Greece, France, etc.) but also overseas countries, such as India, Egypt, South America, Uruguay and Brazil.



### Mounted Ploughs and Hoes.

Like every highly industrial country, Czechoslovakia develops the manufacture of production means in the first place. One of the most important items of this range are farm machines and implements, ensuring that farmers obtain maximum yields from any kind of soil. The implements are designed both for stony and calciferous highland soils and for the most fertile humous soils of lowlands. This all-round versatility is the answer to the enthusiasm of both foreign and inland customers for the Czechoslovak farm machines and implements. The Foreign Trade Corporation of MOTOKOV supplies these machines and implements to East Europe - Rumania, Poland, Hungary, the Soviet Union, to West European countries such as Belgium, France, England, as well as to overseas countries such as Canada, South America, India and many others.

The most important place is held by ploughs, whether they be trailing or mounted types, cultivators, etc. An interesting product of the Czechoslovak farm machine industry is the PN 532 Mounted Five Bottom Plough, designed for skinning of stubble fields of every description of soil to a depth of 10 cm or 4". Its working width is 125 cm or 4'1 1/5" and it is designed for tractors of over 25 HP. With its weight of approximately 235 kg or 518 lbs and output per hour of 0.35 ha or .86 ac. at a speed of 5 km or 3.11 m.p.h., this plough ranks among the most efficient implements of its category.

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Similar is the PN 242 Mounted Two Bottom Plough. Its overall working width is 60 cm or 1'11 3/5" (working width per bottom 30 cm or 11 4/5"). Its maximum cutting depth is 25 cm or 10". This plough is designed for tractors of over 25 HP. Its output per hour is 0.25 ha or .62 ac. at a speed of 5 km or 3.11 m.p.h. It will be found of particular advantage for the cultivation of cereals and technical row crops in light and mean heavy soils.

The KPN 6 A Mounted Beet Hoe, based on the same principle as the described ploughs, is designed for hoeing of row crops spaced from 38 to 80 cm or from 1'3" to 2'7 1/2". With normal setting of the hoe units, this hoe operates on six rows. Its overall width is 320 cm or 10'6", while its weight including a complete set of hoe units, accessories and markers is approximately 570 kg or 1257 lbs. The hoe is designed in the first place for tractors of over 25 HP. The maximum working depth of the side points is 8 cm or 3.15" - centre points and chiselling 12 cm or 4.72". Its output per hour is 0.8 ha or 1.98 ac. at a speed of 6 km or 3.73 m.p.h.

The design of all the types of exhibits develops new ways to facilitate and simplify the work of all farm workers. The result of this endeavour is the range of mounted ploughs designed for use with the Zetor 35 tractor. One of the most outstanding products of this range is the 2 - PNO - 35 Reversible Mounted Two Bottom Plough, suitable particularly for mean and deep ploughing of small, rather sloping pieces of land and for one-sided ploughing of plains. It has the priceless advantage of being reversible when ploughing in opposite directions. The working width per bottom is 35 cm

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or 1'1 3/4", the overall working width being 70 cm or 2'3 2/5" at a maximum cutting depth of 27 cm or 10 3/5". Its gross weight, attachments included, is approximately 400 kg or 880 lbs.

Similar features has the 3 PN 30 N Mounted Three Bottom Plough fitted with a 3 PN 35 frame. Its overall working width is 105 cm or 3'5 1/3" at a cutting depth of 28 cm or 11". The rearmost bottom is detachable. The disc share and the three fore-points ensure proper transfer of the ploughed soil. Its gross weight is approximately 460 kg or 1014 lbs, the row spacing of the bottoms being 65 cm or 2'1 3/5". Compared with the 3 PN 35 N Plough, it differs in its bottoms of 12", ensuring more thorough cultivation of the soil.

Another model of this range is the 4 PN 30 Tractor Mounted Four Bottom Plough with an overall working width of 120 cm or 3'11 1/4" at a maximum cutting depth of 24 cm or 9 1/3". It is also designed for the Zetor 35 tractors. The frame is partly detachable, thus enabling this plough to be used as the 3 PN 30 Three Bottom Plough and to enjoy all its advantageous features.

All the products described are exported by the Foreign Trade Corporation of MOTOKOV. They can be seen at the Third Exhibition of Czechoslovak Engineering in Brno.



# TRAILING AND MOUNTED PLOUGHS AT THE IIIrd EXHIBITION OF CZECHOSLOVAK ENGINEERING

This year another Exhibition of Czechoslovak Engineering has been arranged in Brno, the third in sequence. One of the most interesting stands is that displaying farm machines, incorporating, in addition to standard products, also a number of important and outstanding novelties for facilitating the drudgery and hard work encountered in farming, and ensuring the maximum possible yields of cultivated soil.

In the first place there is a range of ploughs, designed for various purposes, various soils and various working conditions. One of these interesting exhibits is the 3 PZ-35 Heavy Duty Tractor Trailed Three Bottom Plough. In the first place this model is designed for ploughing cereal and technical crops of a specific resistance of  $1.2 \text{ kg/cm}^2$  or 17 psi at a ploughing depth of 30 cm or 11.8". The plough is fitted with forepoints and a disc share ensuring proper transfer of the ploughed soil. It is designed for tractors of over 35 HP. One share is detachable. With its relatively low weight of 1400 kg or 3080 lbs and a working width of 105 cm or 3'5 1/3" this plough ranks among the most efficient farm implements of its class.

A variation of this plough is the 5 PZ-35 Tractor Trailed Five Bottom Plough. It is a heavy duty trailing plough for tracklayer tractors of over 50 HP. Fitted with fore-points and a disc share, one bottom being detachable, this plough is designed for ploughing cereals and technical row crops

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of a specific resistance of  $1.2 \text{ kg/cm}^2$  or 17 psi at a ploughing depth of 11.8" or 30 cm. Its working width 175 cm or 5'9" and weight 1990 kg or 4387 lbs.

In addition to the aforementioned heavy duty ploughs, also ploughs designed for the cultivation of light soils can be seen.

Such is, for instance, the MARS-PICCOLO 332 Tractor Trailed Three Bottom Plough. Its overall working width is 75 cm or 2'5 1/2" and its maximum cutting depth 21 cm or 8 1/4". Its output per hour is 0.35 ha or .86 ac. at a speed of 5 km or 3.11 m.p.h. and its gross weight including the full range of attachments is 236 kg or 520 lbs. The range of attachments incorporates also a full set of replacement points.

A similar type is the 3 PN-35 Tractor Mounted Three Bottom Plough. Its working width is 105 cm or 3'5 1/3" at a ploughing depth of 28 cm or 11". The rearmost body is detachable. It has one disc share and three fore-points. Its gross weight is 460 kg or 1014 lbs. The interrow spacing of the bottoms is 65 cm or 2'1 3/5".

An alternative of the 3 PN-35 plough is the 3 PN - 35 N Mounted Three Bottom Plough with slightly extended frame and bottom spacing of 70 cm or 2'3 1/2". Its rearmost bottom is detachable. Its working width is 105 cm or 3'5 1/3" at a cutting depth of 28 cm or 11", while its gross weight, attachments included (set of replacement points), is 497 kg or 1095 lbs. This plough is designed in the first place for cultivation of light soils.

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The range of exhibits incorporates also a novelty of no minor importance, the 3 PN-30 Tractor Mounted Three Bottom Plough. Actually this is a variation of the 4 PN-30 Tractor Mounted Four Bottom Plough, with an overall working width of 120 cm. or 3'11 1/5" and maximum cutting depth of 24 cm or 9 2/5". The partly detachable frame enables this type of plough to be used alternatively as a three-bottom or four-bottom plough. Its gross weight is 460 kg or 1014 lbs, with the frame detached 425 kg or 937 lbs. It is designed for cultivation of light and mean heavy soils.

The ploughs described are included in the standard Czechoslovak export schedule of the Foreign Trade Corporation of MOTOKOV, Praha. Their reliability, precision, craftsmanship and value for money makes them popular particularly in Poland, Roumania and Western Europe (France, Belgium, etc.).



#### Cultivators at the Third Exhibition of Czechoslovak Engineering .

Numerous farm machines of every description can be seen among the more than four thousand machinery exhibits at the Third Exhibition of Czechoslovak Engineering in Brno .

A most interesting group is formed by the cultivators exported by the **MOTOKV** Foreign Trade Corporation to a number of countries. Among these there ranges in the first place the **KHN 280** mounted cultivator for depth soil loosening, for fitting to the Zetor Super tractor . Its frame is fitted with 19 clips with replaceable tools . The working width of this machine is 280 cm or 11'6" , its maximum working depth being 20 cm or 7.87" . The pitch of the individual tines is 15 cm or 5.91" . The working speed of the **KHN** cultivator is 5 km or 3.11 m.p.h., its gross weight including attachments being 530 kg or 1168 lbs .

The **KN 170 P** mounted cultivator has 17 semi-fixed tines, secured in three rows of welded-on yokes . The tine pitch is 15 cm or 5.91" , the maximum working depth 12 cm or 4.72" , while the overall and working width of the machine is 255 cm or 8'4 2/5" . Due to its weight of approximately 300 kg or 660 lbs and to its output of 0.6 ha or 1.48 ac. at a speed of 6 km or 3.73 m.p.h. the **KN 170 P** cultivator ranges among the most economical machines of its class .

Another interesting exhibit is the **KHZ 200** heavy duty trailing cultivator for depth soil loosening. It cultivates soil up to a depth of 30 cm or 11.8" . Alternatively, it can be used with nine or seven points,

with the possibility of replacing various working tools. Its maximum working width is 200 cm or 6'6 3/4" . The machine is designed for tractors of over 35 HP, its working speed being 5 km or 3.11 m.p.h. Its gross weight is approximately 750 kg or 1654 lbs .

A novelty of exceptional importance, introduced for the first time at the Engineering Exhibition in Brno of this year is the **KPZ 260** trailing cultivator, designed for surface preparation of seed beds up to a rolling resistance of 0.7 kg/cm<sup>2</sup> or 10 lb/sq. in in particular. It is designed for use with tractors of over 25 HP . Its working width is 262 cm or 8'7" , its maximum working depth being 15 cm or 5.91" . Its output per hour at a speed of 3.3 km or 2 m.p.h. is 0.85 ha or 2.1 ac., while its maximum working speed is 3.5 km or 2.11 m.p.h. The weight of the **KPZ 260** cultivator is approximately 550 kg or 1212 lbs .

Many of the machines described have proved useful, for instance, in Ireland, Iceland, Finland, Bulgaria, South America, Egypt, etc., giving evidence of the high quality and development of the Czechoslovak machine industry, able to build reliable machines for all weather conditions .



### Farm Trailers

Farm trailers are invaluable partners of the farmer in the transport of cargos of every description, being suitable both as horse-drawn or as tractor driven trailers. The Exhibition displays both types of these trailers. Visitors can see in the first place the T 3.5 P VB 2 Tractor Trailer with a carrying capacity of 3200 + 350 kg or 7055 + 770 lbs. The trailer is designed for the transport of major cargos; its maximum travelling speed is 20 km or 12.4 m.p.h. The chassis is an all-steel welded construction. The front axle has motor vehicle steering reducing the turning radius of the trailer to that of the tractor. The rigid rear axle is fitted with internal expanding brakes, operated mechanically or by means of an independent pressure air system. The road wheels are fitted with ball/roller bearings. The cargo platform has folding side panels and tailgate, its loading area being 3.9 x 1.8 metres or 12'10" x 5'11". It can be tipped to either side in driving direction. (The tipping mechanism is hand operated.) A seat for two persons is fitted at the front. The vehicle has sturdy semi-elliptical leaf springs. Tyres 7.50 - 20", track 1.3 metres or 4'3 1/5". Loading height up to 105 cm or 3'5". Weight 1450 kg or 3197 lbs.

A novelty among the exhibits is the DP 2.5 S Two Wheel Trailer, tipping to either side or rearwards by means of a telescopic hydraulic ram connected to the hydraulic power unit of the tractor. The trailer is fitted with a hand brake for both wheels within easy reach from the tractor driver's

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seat. The loading area of this vehicle is 4.8 m<sup>2</sup> or 51.66 cu.ft., the carrying capacity being 2500 kg or 5500 lbs. The maximum travelling speed is 30 km or 18.6 m.p.h., the weight of the trailer approximately 750 kg or 1653 lbs and its length 440 cm or 2'3.3".

Another novelty is the PV 2.5 Animal Traction Waggon for the transport of cargos by animal traction. It is a waggon of simple but sturdy design, having a carrying capacity of 2500 kg or 5500 lbs. The waggon is not sprung, nor is the platform tipping. The side panels, however, can be folded into horizontal position, thus giving a loading area of 2.45 x 5 metres or 8'x 16'5". The gross weight of the fully loaded vehicle is approximately 3450 kg or 7600 lbs.

An exhibit of interest is also the P-900 Tractor Trailed Sprayer for spraying of crops in horizontal plane or for spraying field crops and trees. It is also suitable for various other sanitation purposes. The sprayer can be adapted for wide range spraying of fields. For this purpose it can be fitted with a nozzle frame of 12 metres or 39'4" working width. In addition, connectors for high pressure delivery hoses for spraying trees or bush plantations can be mounted. 2 to 6 extensions can be used simultaneously. For horizontal spraying with the nozzle frame the respective output per hour is 1.3 to 2 ha or 3.21 ac, the volume being variable from 250 to 750 litres or from 55 to 165 Imp.galls. The tank capacity is 900 litres or 198 Imp. galls. The pump is a single stage, plunger-type horizontal unit of 35 lit. or 7.7 Imp. galls. output. Its gross weight is approximately 1430 kg or 3152 lbs.

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The described exhibits are shown at the Third Exhibition of Czechoslovak Engineering as well as exported abroad by the Foreign Trade Corporation of MOTOKOV. Their ever increasing popularity is evidenced by the constantly increasing demand for them both from European countries (France, Belgium, Finland, Greece, Roumania, etc.) and from overseas countries (Sudan, Egypt, India, South America, etc.).

### Manure Spreaders

Essential aids in farm work are various machines for manure transport and spreading. The farm machine stand at the Third Exhibition of Czechoslovak Engineering incorporates the RPT 2.5 Liquid Manure Trailer, suitable for any liquid manure with the exception of acids. It is fitted with a vacuum compressor for pumping dung, able to fill the entire tanker-trailer of  $2.3 \text{ m}^3$  or 81.22 cu.ft. within 3 minutes, the emptying period being 2 minutes. Its dry weight is 2400 kg or 5290 lbs, its maximum front axle pressure 3700 kg or 8157 lbs and rear axle pressure 3400 kg or 7495 lbs. The LK 70/70 compressor gives an output of  $200 \text{ m}^3$  or 706.29 cu.ft. per hour. The maximum permissible load is 5610 kg or 12,368 lbs.

A novelty of great importance is the NH - 100 - A Manure Loader with adaptors. The loader is hydraulically operated, attached to the drawbar of the tractor. A special feature of the loader is the possibility of swinging the turret by  $180^\circ$  and of replacing the fork with an excavator shovel, which will prove of particular advantage when loading manure of various densities. The weight of the machine is 800 kg or 1754 lbs. The working pressure of the loader is  $70 \text{ kg/cm}^2$  or 996 psi. The loader arm has a range of 100 cm or 3'3.37". The output per hour 120 to 150 metr.q. or 2650 to 2960 lbs.

The RMT 3 Manure Spreader is designed for spreading various types of manure. It is of a steel, welded construction, mounted on a two-wheel undercarriage. The spreader bod is of semi-circular section. The principal working unit - the spreader plate - is operated by means of a chain drive from the transmission system. The machine gives an output per shift

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/8 hours/ of approximately 1.5 ha or 3.7 ac. The permissible load is 3500 kg or 7716 lbs; the wheel tread is 145 cm or 4'9". The gross weight of the machine is 1520 kg or 3350 lbs. The RHN 300 Mounted Spreader can be fitted to a tractor of at least 25 HP.

After slight modification the machine can also be front-mounted to a tractor.

Another exhibit from the range of farm machines is the DT 7 Long Timber Tractor Trailer of 7000 kg or 15,432 lbs capacity. The maximum permissible travelling speed is 30 km or 18.6 m.p.h., the weight of the chassis being approximately 2420 kg or 5335 lbs.

The described farm machines are exhibits of the Foreign Trade Corporation of MOTOKOV, the sole exporter of farm machines of every description. Machines are exported to Belgium, France, Greece, Egypt, Sudan, South America, India and many other countries.

# Farm Machines at the Third Exhibition of Czechoslovak Engineering .

Of the wide range of farm machines shown at the Third Exhibition of Czechoslovak Engineering, beet and potato machines rank amongst the most interesting ones.

The TB 10 potato grader grades potatoes into 4 groups or classes according to size. It is driven by a built-in electric motor of 85 KW input, attaining a speed of up to 1400 RPM. The gross weight of the machine is approximately 800 kg or 1764 kg. The machine is fitted with frames moving in opposite directions and provided with replaceable screens. Its output per hour is approximately 20 q or 4400 lbs.

An extremely popular machine is the so-called CERT /Devil/ animal traction potato digger. Extremely light operation is one of its advantageous features. It operates on a single potato row, its 6 forked shovels throwing the dug-out potatoes to the side for easy collecting. The speed of the thrower wheel is 87 RPM at a travelling speed of 4 km or 2.49 m.p.h., the weight of the machine being 260 kg or 517 lbs and output per 100 hours approximately 2 ha or 5 ac.

Another interesting machine is the SRZ 42 silage combine. Being designed for harvesting both green and dry fodder, it has replaceable mechanisms for short stalk fodder up to a height of 150 cm or 4'11", for high-stalk fodder of over 150 cm or 4'11" in height and for dry fodder. The machine mows and collects the fodder, chops it and blows the chopped fodder into a passing cart with the minimum number of operators. The machine is also suitable for cropping of fresh maize and sun flowers up to a height

of 330 cm or 10'10", as well as for collecting of dry fodder plants and straw behind combines. The output of the machine varies according to the kind of green growth from 150 to 200 q or from 33,000 to 44,000 lbs per hour or 0.6 ha/1.48 ac. of dry fodder or straw per hour. The working width of the cutter bar is 129 cm or 4'2 4/5", the weight of the machine being approximately 1300 kg or 2866 lbs.

Another interesting exhibit is the DT 1 milking machine, designed for three-stroke power milking of cows. A feature of particular advantage is its prompt conversion into a two stroke machine by replacing a single component: the third, rest stroke, being of great importance for the health condition of milch cows. The weight of a single milking unit is approximately 10 kg or 22 lbs, but several units can be connected simultaneously. Attention is attracted also by the solid fodder mixer, powered by a built-in electric motor of 4 kW input, giving an output per hour of approximately 20 metric q. or 4400 lbs.

All the farm machines described are exported by the Foreign Trade Corporation <sup>OF</sup> MOTOKOV. They are most popular particularly in Finland, Greece, Belgium and other European countries, as well as in the countries of Latin America, Africa and Asia.



Some Farm Machines at the Third Exhibition of  
Czechoslovak Engineering.

A highly interesting exhibit is, for instance, the NTB 28 tractor trailed disc harrow. Being designed for the preparation of seed beds, it can also be used for skimming of stubble fields and general land preparation: for crushing clods, cutting sods, etc. It has 28 discs of 45 cm or 17.7" dia., the working width being 225 cm or 8'4". Due to its weight of 510 kg or 1124 lbs the harrow cultivates the soil to a sufficient depth, provision being made for the fitting of additional weights. At a speed of 5 km or 3.11 m.p.h. the output per hour is approximately 1.1 ha or 2.72 ac.

The type TDBTS 5A tractor tine harrow is likewise designed in the first place for the preparation of seed beds being nevertheless suitable for any other preparation on jobs such as land harrowing and loosening, surface smoothing, pest control, etc. It has five squares of a working width of 480 cm or 15'9". Each square is fitted with 20 tines spaced at 4.8 cm or 1.89"; the total number of tines is 100. The weight of the harrow is approximately 240 kg or 530 lbs. Its output per hour at a speed of 5 km or 3.11 m.p.h. is 2.4 ha or 5.93 ac. approximately.

Another interesting exhibit available for inspection by visitors to the Brno exhibition is the 2 SZ 210 P power rake and tosser, two-purpose machine. Mounted to a tractor, it either rakes the fodder, or, with the drum operating in reverse direction, it tosses, loosens and airs the fodder to ensure speedier drying. Its design enables it to be modified so as to be suitable also for animal traction. It consists of two parts, the working

width of one part being 210 cm or 7'10.7"; of both V-connected parts for raking about 520 to 600 cm or 17'1" to 19'8". The weight of one part is 495 kg or 1091 lbs. Its output per hour is approximately 2.5 ha or 6.18 ac. at an operating speed of 7 to 8 km or 4.35 to 4.97 m.p.h. The machine requires no special attention in handling; for its preparation two operators are needed; in operation, it can be controlled by the tractor operator.

The fertilizer spreaders are likewise of great assistance in the cultivation of soil. At the Third Exhibition of the Czechoslovak Engineering in Brno two models of such spreaders can be seen among other machines: the NOVITAS 2 m spreader for animal traction and the NOVITAS 3 m tractor spreader. The NOVITAS 2m has a working width of 200 cm or 6'6 3/4" and an output per hour of 1.2 to 1.6 ha or 2.96 to 4.38 ac. at a speed of 6 km or 3.73 m.p.h. The Novitas 3 m can be used with any model of tractor fitted with a drawbar or a towhook. It has a working width of 300 cm or 9'10" and a filling capacity of 145 dm<sup>3</sup> or 8845 cu.in. The machine weighs 300 kg or 661 lbs and has an output per hour of approximately 1.6 ha or 4.05 ac. at a speed of 6 km or 3.73 m.p.h.

Many of these machines, exported by MOTOKOV Foreign Trade Corporation, are popular both in the countries of Eastern Europe: Bulgaria, Hungary, the Soviet Union, etc., as well as in France, Belgium, Ireland, South America, India and other countries.

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### H a r v e s t e r s

Visitors to the farm machine stand at the IIIrd Exhibition of Czechoslovak Engineering will be interested in harvesters, grass mowers, fodder cutters, etc., both tractor driven and for animal traction. In the first place there is the type ZT 183 Tractor Trailed Cutter Bar. This is a semi-mounted, RH cut, swinging bar, attached to a forked arm which is swivel mounted to the drawbar frame of the machine. The drawbar frame is welded, firmly attached to the remaining hitching system of the tractor and adaptable to bumpy terrain. The rear of the drawbar frame is mounted on a freely revolving land wheel fitted with a Bantam tyre 16 x 4". The cutter bar is semi-dense, the working width 183 cm or 6 ft. The scythe is driven from the power take-off shaft of the tractor by means of an intermediate telescopic shaft. The cutter bar has three positions: working position at ground level, centre position in horizontal and transport position in vertical plane. An adjustable pawl lock enables the bar to be swung rearwards when encountering any major obstacle while in working position. The maximum travelling speed while mowing is 6 km or 3.73 m.p.h., the mean scythe speed being 2.19 metres or 7.18 ft. per second. The weight of the machine is approximately 210 kg or 463 lbs.

Another machine for use on cereal crops is the ZVZ 210 Tractor Driven Binder. It is a LH cut machine with a working width of 210 cm or 6 ft. 10.7 in. Transport of the mown corn is effected by three canvasses. The entire binder assembly is a light construction of pressed metal sheets. It is

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fitted with a worm-type divider. Two wheels serve for both transport and working purposes. The maximum operating speed is approximately 7 km or 4.35 m.p.h., the output per hour being approximately 1.5 ha or 3.6 ac.

An interesting novelty is the re-designed ZT 138 Harvester for animal traction. The swathing is controlled by means of a hand lever within easy reach of the operator's seat. The cutting-off of the machine and the swinging of the harvester table is likewise readily controllable. The main transmission gear is made of high quality cast iron - the drive pinion of the main drive gear being of high quality steel. The working width of the machine is 138 cm or 4' 6 1/3", its weight being approximately 390 kg or 860 lbs.

From the range of beet diggers there is the SKR 1 Beet Combine. This is a single row beet machine, cutting the leaves first and then digging the sugar-beet. Both the cut off leaves and the dug-out roots are separately conveyed into special reservoirs which are tipped at regular intervals. The operating speed of the combine is approximately 3 km or 1.86 m.p.h., its output being approximately 0.8 ha or 1.98 ac. per shift. The machine is designed for use with 35 HP tractors.

The two-row 2 BVZ Potato Digger will prove useful for digging potatoes. It serves for digging two rows of machine-planted potatoes with an inter-row spacing of 70 cm or 2' 3 1/2". The machine can be used with tractors of over 25 HP. Its working width is 140 cm or 4' 7.1", its weight approximately 650 kg or 1433 lbs and its output per hour 0.45 ha or 1.11 ac.

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The Foreign Trade Corporation of MOTOKOV exports the described farm machines as well as many others almost to every part of the world. An ever increasing demand for Czechoslovak farm machines from Finland, Greece, France, Belgium, Iceland and from overseas affords evidence of the popularity they have gained due to their reliable performance, operating economy, high quality and precision craftsmanship.



### Harvesters and Hay Mowers

At the IIIrd Exhibition of Czechoslovak Engineering the attention of visitors to the farm machine stand will be attracted to the harvesters. One of them is the PRIM Corn Harvester for animal traction with a working width of 152 cm or 4'11.89". With the exception of the first pair of gears the entire transmission gear of this machine runs in an oil bath. The main drive gear and the eccentric shaft run on ball/roller bearings, ensuring light and smooth operation. Swathing is effected by four rake-fitted swathers, control by means of a hand lever within easy reach from the seat. The handling of the cutting-off mechanism is easy and tipping of the harvester table easily carried out. The table is all-metal, fitted with a frame with riveted-on zinc-plated sheet metal. Proper balancing of the machine eliminates fatigue of the traction animals. To ensure complete relieving of the hitch, also machines fitted with a land wheel supporting the split hitch can be supplied on request. The PRIM Harvester has a weight of approximately 410 kg or 903 lbs, its maximum operating speed being 6 km or 3.73 m.p.h.

Subsequent treatment of the mown corn is effected by another exhibit, the MAJ 90 Thresher with clover husker, suitable for threshing any kind of corn, oil plants and legumens, as well as of rape, poppy, clover, etc. The clover husker is arranged so that it can remain in position when threshing other kinds of corn. The frame

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of the thresher is a steel construction with a timber lining. It has a steel, box-type, open drum, a basket with an adjustable grate, a shaker and fine shaker, perfect cleaning and a gleaner fitted with cast iron liners. It is provided with a chaff and ear sucker. The thresher is designed to ensure perfect threshing and cleaning procedure with the minimum of corn waste. It is powered by an electric motor of 25 kW input, type RFU 92 A, for A.C. of 380/220 Vm running at a speed of 2960 RPM. The output per hour of the machine with 4 to 5 operators is 20 metric q. or 4400 lbs when threshing wheat of 43.5 % yield and corn moisture of 16 %.

For further treatment of the straw behind the thresher various models of straw presses are used. Extremely popular is the reinforced LS 130 Pendulum Press which presses and bales the straw, conveying the bales along scantlings. The baler unit is driven by gear wheels, provision being made for adjustment of the string tension. The main shaft runs on ball bearings, the remaining shafts and pins in hardened bushings. The size of the press mouth is 1300 x 300 mm or 4'3.18" x 11.8", the output per hour being approximately 30 to 35 metric q. or 6600 to 7716 lbs. The bale size is 300 and 500 mm or 11.8" and 1'7.7". With its low weight of approximately 1025 kg or 2260 lbs, the machine has a high and reliable output.

A similar press model is the SLK - 130 Collector Press with transmission shaft, used mostly for collecting and baling dry straw or fodder from the field. It can be used with

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tractors of an output of at least 25 HP. Its working width is 130 cm or 4'3.18" and its weight 1400 kg or 3086 lbs. In addition to the tractor driver, two operators are needed, one working directly on the press, the other on the truck to which the baled material is conveyed along the scantlings from the press. The output per hour is approximately 0.5 to 1 ha or 1.24 to 2.471 ac. The pneumatic corn blowers can be used either separately as conveyors of corn to granaries or in combination with threshers, this being of particular advantage in places where the thresher can be placed near the corn store within the range of the blowing capacity of the blower. The principal part of the Z-3-A Corn Blower is a blower unit mounted on the shaft of an electric motor with an input of 9 to 11 kW. The blower forces the air through a pipe line the front end of which is connected to the feed basket, its opposite end being fitted with a deflector which prevents undue dispersion of the corn. The pipe line incorporates several pipes of various lengths to be linked by means of special clips. The Z-3-A Corn Blower can convey 50 metr.q. or 1100 lbs corn to a distance of 50 metres or 164 ft. and a height of 10 metres or 33 ft. per hour. It can be easily moved, its weight being approximately 415 kg or 915 lbs.

Modern farming makes use also of blowers for hay, straw, fodder, etc. The Exhibition shows the TORON Hay Blower, eliminating drudgery when unloading and storing hay, straw, etc. The machine is powered by an amply dimensioned mean pressure blower which blows the material through a pipe line

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of 50 cm or 1'7.7" to its respective place of storage. To prevent clogging of the pipe line the machine is fitted with an automatic strangler. The machine is all-metal, easy to dismantle and easy to accommodate. The pipe line consists of pipes and elbow pieces of 45°, 1 metre or 3.3 ft in length, made of galvanized sheet metal. The pipe lengths can be linked by means of patent clips with lever type fasteners. The machine is most suitable for use with a thresher. Powered by a motor of approximately 7.5 HP, the TORON has an output per hour of 2500 to 3000 kg or 5500 to 6600 lbs hay or straw to a distance of 30 metres or 98'5" and a height of 10 metres or 3'3.37". The weight of the machine, pipe line excluded, is approximately 300 kg or 660 lbs, the individual parts of the pipe line having a weight of 15 kg or 33 lbs.

A complete novelty is the VSNP Hay Blower fitted with crunching and feeding units. Like the TORON, it is designed for pneumatic conveying of stalky crops (hay, straw, etc.). Its output is also identical. The machine is powered by an electric motor 380/220 V of 7.5 kW input and a speed of 1300 RPM. New is the crunching, and feeding unit which automatically prepares the material for transport. The operation of the machine is extremely smooth, the blower shaft being mounted on ball bearings.

All the farm machines described are exported by the Foreign Trade Corporation of MOTOKOV. The ever increasing export of the Czechoslovak farm machines affords evidence of their high popularity abroad. The principal consumers are Finland, Greece, France, countries of Eastern Europe, Egypt, India, as well as South American countries, Mexico, etc.



### A BIRD'S EYE VIEW

We landed at the airport in Brno. In the same Brno where the gates of the III Exhibition of Czechoslovak Engineering had already been opened. Our situation was particularly interesting owing to the fact that we flew to Brno in an aircraft which is one of the exhibits of this exhibition.

The Czechoslovak Avia 14 transport aircraft, which we left a short while ago, has been developed from the former well-proven IL 14 aircraft. The aircraft is constructed for 24 to 30 passengers. It has a three-wheel undercarriage, de-icing of the wings and propellers, a heated cabin, all the necessary flying and navigation instruments and complete radio equipment. Its main features are particularly absolute safety of flight, a short take-off and the possibility of landing on green airfields.

Another type, the all-metal Z 226 aircraft, is designed for light training of pupil and advanced pilots and for high aerobatics. It has dual controls, two instrument panels and tandem seats. Its outstanding features are great climbing capability and a short take-off; it is often used for towing sailplanes and publicity streamers.

A further type of the "gallery" of Czechoslovak aircraft, which is being displayed at the Brno Exhibition, serves a somewhat different purpose when compared with the two planes mentioned above. The all-metal high-wing L 60 aircraft is intended primarily for agriculture and the transport of sick people. With complete agricultural equipment it is used

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for dusting and spraying of field crops and forest culture. For this purpose it has in its fuselage a tank holding 350 litres of powder or liquid. It is possible to change this aircraft easily into an ambulance plane. If adjusted in this way two sick people on stretchers can be comfortably transported in it. Both equipments - for agricultural as well as ambulance purposes - can be dismounted in a short time and, within a few hours, the aircraft can be converted to receive four passengers for a perfectly comfortable flight. The single-engined Meta-Sokol aircraft is also worthy of note. It is an all-metal, four-seater sports aircraft with a specially designed three-wheel undercarriage. The sole exporter of Czechoslovak aircraft is the foreign trade corporation of OMNIPOL in Praha.

MAXIMA-AVANT BOOK-PRINTING PRESS.

This press is a semi-automatic machine for economic production of single and multi-colour prints, for reprinting of complete forms and non-machinery preparation or printing of smaller editions. During printing it produces a pressure of approximately 8,000 kg which corresponds to the conditions of production printing machines.

The pressure cylinder with a connected rolling-on carriage is driven by an electromotor firmly mounted on the rear side wall of the machine, the movement of which is transmitted to the pressure cylinder by a rotating spline shaft and worm gearing. The pressure cylinder is mounted in antifriction bearings. Its side guide is also arranged in antifriction bearings. The catches open automatically and are then closed by a foot-pedal. The machine is push-button controlled.

After printing the reprint slides out automatically in front with the printing upwards on the outlet grate in front of the pressure cylinder from where it can be freely removed.

The colour-container consists of 4 elastic cylinders and of 5 steel cylinders with side grinding. It has an independent electromotor drive. All its functions are controlled by a single lever including stopping of the rolling-on cylinders. Their carriage can be disconnected and replaced with another one for multi-colour operation. The complete colour-container can be quickly cleaned by means of a built-in automatic washing equipment.

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MAXIMA - GUARDIAN Matrix Cleaner

The matrix cleaner for line setting machines is an automatic instrument for mechanic removal of impurities adhering to the surface of all operating surfaces of the matrix during machine type-setting.

Cleaning is carried out according to the degree of soiling of the matrix, either in dry or moist condition with three pairs of double wheels lined with felt and with two pairs of brushes.

The purpose of this machine is to eliminate the necessity of slow and tiring hand cleaning of the matrices during operation in the machine type-setting room and to prolong their service-life by regular cleaning.

In the Maxima-Guardian cleaner there can be cleaned matrices of a thickness of from 0.76 to 4.512 mm. Soiled matrices are put into the storage-container of the cleaner by hand during operation of the machine. Cleaned matrices come into the outlet storage container where they are arranged automatically.

The instrument cleans a maximum number of approximately 1800 to 2100 pieces of matrices, practically approximately one set per hour, which is about a quarter of the time required for hand cleaning.

The cleaner is driven by a single-phase induction motor of 90 Watt, 1390 r.p.m., 220 V / or 120 V/.

Dimensions of the machine: length 795 mm, width 312 mm, height 352 mm; net weight approximately 24.50 kg.

The sole exporter of the machine is the foreign trade corporation of KOVO - Praha.

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GRAFOPRESS Cover Automatic Machine

This year's model of the GRAFOPRESS, exhibited for the first time at the Graphic Salon at Lausanne, has in common with the first Z T 47 model only rotating catches, the principal element of the old Gilke's patent from the year 1912.

By some ingenious improvements of the GRAFOPRESS the original German type has been also surpassed. These comprise, for example, simultaneous adjusting of both rails of the rolling-on cylinders, switching off of the carriage of the rolling-on cylinders, adjusting of the side grinding, stopping of all the elastic cylinders with one lever, careful covering of the whole machine and others which offer the machinist valuable advantages in operation.

As all modern printing machines, the GRAFOPRESS has also a tilting colour-container, central lubrication, equipment for automatic washing of the cylinders, powdering equipment, continuous and vibration-proof speed control, mounting of the rolling-on cylinders in ball bearings, all of which increase the capacity of the machine, especially with regard to the quality of printing.

Technical Specifications:

Minimum paper size: 5 x 8.5 cm

Maximum paper size: 26 x 35 cm

Capacity: up to 5000 prints per hour /according to the kind of paper and form/

Motor: three-phase induction 220/380 V, 1.1 kW 1420 r.p.m.

Net weight: approximately 1110 kg

Gross weight: approximately 1320 kg

Overall size: 1450 x 1750 mm

The sole exporter of the machine is the foreign trade corporation of KOVO - Praha



#### Graphic Machines at the Brno Engineering Exhibition

The exhibited graphic machines, especially the MAXIMA 4 hydraulic high-speed paper cutting machines, form an interesting group at this year's Brno exhibition.

On these machines the mechanical driving mechanisms of the clamp and knife have been replaced by an amply dimensioned hydraulic system. The fact that all mechanical mechanisms which are, above all, subject to wear and damage, have been dispensed with, results in higher operating reliability of the hydraulic paper cutting machines. A robust design, high output, accuracy of cut and simplicity of the push-button control are their principal features. Popular above all is the photo-electric safety guard because of which the MAXIMA 4 is known as "the machine that obeys". This attachment immediately returns the knife to its upper position and switches off the machine when the operator or a third person puts his hand into the protected field, accidents thus being prevented.

Even during its first demonstration the MAXIMA-FRONT high-speed automatic letterpress machine aroused the keen interest of experts. This machine is intended for single- or multi-colour printing of books, leaflets, periodicals, prospectuses and other printed matter. It is suitable for paper, 56 x 76 cm in size, producing 3600 inprints per hour.

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The GRAFOPRESS automatic printing machine can be used for any single- or multi-colour printing job. It prints, virtually, on every kind of paper ranging from air-mail up to cardboard paper. It is provided with numerous outstanding features designed to facilitate the printer's work and improve the quality of print. These incorporate, for instance, rail adjustment of the distributing rollers by means of a single central screw, lifting of the distributing rollers, improved ink distribution and inking, one lever adjustment of the form inking rollers, automatic washing of rollers, central lubrication, etc.

In addition to the machines mentioned above visitors to the Third Exhibition of Czechoslovak Engineering will also be able to inspect the MAXIMA-GUARDIAN disc-type cleaner of matrices of linotype or intertype setting machines, as well as the bench type line saw. The type setting machines include an interesting novelty, viz. editorial type with bold type and italics.

The Czechoslovak graphic machines displayed at this year's Brno Engineering Exhibition will be demonstrated in operation. Their sole exporter is the foreign trade corporation of KOVO.

### Graphic Machines

In the collection of graphic machines there is exhibited at Brno also an automatic speed-press of the MAXIMA-FRONT type for a paper size of 56 x 76 cm. This machine has aroused great interest abroad.

The MAXIMA-FRONT machine has a reliable, universal automatic folder, a three-cylinder colour-container with equipment for stopping of all the elastic cylinders with one lever and an automatic washing device. It has foot controlled pressure release, a non-smearing front chain unloader with high staple, central lubrication and is fitted with helical gearing as well as numerous antifriction bearings, etc. It is a machine which easily produces the most difficult illustrations and surface printing; at the same time it is able at a high speed /up to 3,600 prints per hour/ to print all kinds of current, simple commercial printings.

The exhibited hydraulic high-speed-cutter of the MAXIMA MH 106 type is designed as a completely hydraulic machine, which means that the pressing device as well as the cutter is controlled by the most modern hydraulic mechanism. This design, in connection with photo-cell accident prevention and push-button control, makes possible the achieving of an exceptional capacity as far as quantity and the precision of cut are concerned together with easy and safe operation. The new high speed cutters of the MAXIMA MH type are all fitted with an ingenious automatic device for band and schedule cutting. The machines are fitted with an air cushion which makes handling with a heavy staple of paper on

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the table of the cutter easier. /Completely hydraulic high-speed cutters of the MAXIMA MH type are manufactured in widths of 106, 116 and 130 cm./

For smaller requirements of customers and for the assistance of larger cutting machines there is the high-speed cutter of the MAXIMA H 78 type of a cutting width of 78 cm. Its pressing device is also hydraulically controlled, whereas the cutter has cranks movement. Switching<sup>on</sup> of the machine is done simultaneously by means of two push-buttons.

The exposition of polygraphic machines is supplemented by the Romayor small size offset high-speed machine for a maximum paper size of 36.5 x 50 cm, this being one of the best Czechoslovak export articles. It produces up to 5000 faultless single or multi-colour prints per hour. It is not only a type greatly demanded for home printingshops, but also a profitable supplement of the machinery of larger offset printing shops.

The small ROMINOR offset duplicating machine is a simple, but at the same time exceptionally efficient machine for a paper size of up to 23 x 25.5 cm. It operates with a speed of up to 3000 prints per hour. It is suitable for offices and home printing shops.

The sole exporter of these machines is the foreign trade corporation of KOVO - Praha

Perfect Reception

The display of the Czechoslovak electrical engineering industry occupies a prominent place at the Exhibition of Czechoslovak Engineering which is being held in Brno for the third time this year. It includes various novelties in the field of radio receivers, musical cabinets and TV sets.

Radio receivers incorporate the small T 420 A table receiver in an attractive plastic cabinet of modern shape in various colours. The receiver, which is connected to 120 or 220 V mains is fitted with five miniature valves, 6+1 tuned circuits, a loudspeaker 160 mm in diameter and efficient tone control. Its power consumption amounts to about 45 watts with a 2 watt final stage output.

Another medium type receiver is the push-button controlled A6 "KVARTETO" radio receiver in a modern de luxe cabinet.

The T 420 A receiver will be produced in series by the end of this year while the "KVARTETO" set is scheduled for the first quarter of 1958.

Users of the MINOR battery radio receiver will be pleased to hear that a mains adaptor will soon be on the market. It replaces the battery and enables the radio receiver to be connected to the mains.

Quite an innovation is the MINOR II radio receiver with change-over push-buttons, two wave ranges (short and medium

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waves), 4+1 tuned circuits, 4 valves, a built-in ferrite aerial for medium waves and a frame-type aerial for short waves with directional effects and push-button control of the wave lengths.

The AG radio-gran with an in-built KVARTETO receiver and the ORCHESTER radio-gran with wave range push-button control, a three-speed gramophone and one extra loudspeaker in the cabinet designed for intercommunication purposes, complete this list of radio receivers.

The fine CHORAL musical cabinet with a perfect radio-receiver concludes the brief summary of the numerous novelties in this field.

The new cabinet-type MAROLD TV set with an improved sound mechanism and a 53 cm screen will also be displayed at the exhibition.

All products of the Czechoslovak electric-engineering industry are completely made of parts of Czechoslovak make. A prominent place is, therefore, reserved in the KOVO stand for TESLA radio components, valves and screens, all of which are exported exclusively by the foreign trade corporation of KOVO. In addition, all types of condensers, resistors and other parts used in the electric-engineering industry are exhibited in a great variety of shapes and designs for tropical, polar or standard use.

### Czechoslovak Power Tubes.

The Czechoslovak vacuum industry has not only completed the line of existing transmitting and rectifying tubes but also has designed many new types of high-power tubes which operated economically up to the frequency of 300 Mc/s.

The Czechoslovak vacuum industry supplies power tubes and special tubes for broadcast transmitters, for telegraph transmitters for marine and aircraft use, power tubes for amateurs, further, tubes for medical and industrial R.F. equipment, etc., and its products can be divided into the following groups:

- Radiation-cooled transmitting triodes, tetrodes and pentodes;
- Radiation-cooled modulating tubes;
- Power tubes with external anodes: air-cooled transmitting and modulating tubes, water-cooled transmitting and modulating tubes;
- Rectifying valves, radiation-cooled and water-cooled;
- Mercury-vapour rectifying valves, diodes and triodes/thyratrons/.

An interesting feature of the Czechoslovak air-cooled power tubes is that they include one, the anode dissipation of which is 85 kW, so that they made possible the designing of air-cooled transmitters of highest output power.

The TESLA works manufacture a line of air-cooled triodes, the design of which is based on the well-proved water-cooled types and is completed by many quite new types, the largest of which, the tube RD 85 XH, is the largest air-cooled power tube in the world. When applied as an oscillator in class C connection, this tube deli-

vers an R.F. power of approximately 150 kW. This tube applied in the modulator stage for anode modulation as well as in the output stage as power amplifier, makes it possible to design a transmitter which is completely air-cooled and which delivers more than 200 kW carrier wave power.

The Czechoslovak vacuum industry currently manufactures a line of all-glass power tetrodes for special short-wave applications. This line consists of tubes of 65 W, 125 W, 400 W and 1000 W anode dissipation.

For application in television transmitters in the first band, special tubes are available in Czechoslovakia. These tubes are fitted with external anodes for air-cooling and their anode dissipation are: 2 kW, 5 kW and 20 kW. Special tubes for use in the third television band, i.e. at a frequency of approx. 200 Mc/s, are available also. These are the coaxial tubes of 5 kW and 20 kW anode dissipation.

Further products of the Czechoslovak vacuum industry are vacuum capacitors which are available from 6 pF to 1000 pF for operation at many kV A.C. or D.C. voltage.

Export is dealt with by KOVO, Foreign Trade Corporation, Prague, Czechoslovakia.

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### Of Outstanding Design - the Type VSB - IV Boiler.

At the Brno Exhibition there can be seen an outstanding novelty - a universal high capacity, multi - section heating boiler of the VSB - IV type. In the type VSB - IV boiler there can be burned with high efficiency and economically all solid fuels of a wide range of heating power and assortment. It is designed chiefly, however, for economic combustion of low grade fuels with high water and ash contents.

The type VSB - IV boiler is supplied either as a warm-water boiler or a low pressure steam boiler.

The boiler is of cast iron and consists of individual sections by which the size and capacity of the boiler can be easily adjusted to the actual heat requirements, the ratio of the heating surface, grate surface, hearth contents and filling shaft for each boiler size remaining practically the same and therefore not depending on the number of sections of which the boiler is assembled.

For the manufacture of the type VSB - IV boilers special cast iron, resistant to temperature changes and corrosion-proof, is used, which guarantees an almost unlimited service-life of the boiler. Its quality is continuously watched and checked in the works laboratories.

The boiler is fitted with a tilting grate to facilitate cleaning of the grate during operation and the individual grate rods are exchangeable. The outer boiler walls are provided with a sheet-iron shell with insulating material

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so that minimum losses due to radiation are ensured.

Combustion in the boiler takes place in three combustion chambers arranged one behind the other.

In this boiler quite a new principle of multistage combustion has been used, combined with intensifying of the burning process by means of unusually strong whirling up of hot gases and their perfect mixing with combustion air.

The heating surfaces of the boiler are designed in such a way and of such sizes that they guarantee an intensive passage of heat into the heating medium.

The boiler capacity can be controlled in a very wide range (from 15% to 100% - of rated capacity), the efficiency changing only slightly.

The operation of the boiler is very simple. The adjusting of the combustion air inlet can be easily controlled by hand or by means of an automatic regulator.

Cleaning of the draught flues is done from the top of the boiler, the cleaning covers having been tilted, by means of steel brushes on flexible holders. On the front side of the boiler there is arranged a cleaning door through which also the horizontal flues can easily be cleaned.

To improve draught conditions when starting firing and for quicker starting of the boiler from cold condition the boiler is fitted with firing flaps. These firing flaps serve further to prevent condensation of water vapours in the flues when the operation of the boiler is considerably suppressed.

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The above mentioned outstanding qualities of the type VSB - IV boiler, especially its practically unlimited universal ability to burn any kind of fuel, high capacity and economy prove that it is a product of the highest grade of the up-to-date combustion technique. Its wide applicability for central heating purposes offers the possibility of coping with economic and functional difficulties resulting from reduced fuel quality and the increased investment and operating costs connected with it.

Technical Specification:

Heating surface: 21.00 to 45.00 sq.m

Specific Capacity: 7,000 to 11,000 kcal per sq.m per hour  
(according to the kind of fuel used)

Required draught: 5.0 - 7.0 mm water column

Efficiency: 78 - 85%

Fuel: lignite, non-baking black coal, briquettes, coke, anthracite, peat, wood.

This novelty is exhibited in the exposition of the export corporation of Strojexport.

### Microelementary furnace.

This furnace is designed for the combustion of organic matter, the hydrogen and carbon contents of which have to be investigated.

The furnace consists of a pedestal which houses the drive and electronic control instrument, and of one movable and two fixed tubular furnaces which are mounted on the top of the pedestal. Owing to its advantageous design and the automatic controllable motion, continuous, regular and hygienic gas combustion is achieved in the microelementary furnace. The time intervals of the automatic motion, which is electronically actuated, are controllable within wide limits, so that great accuracy of the predetermined time periods is secured. One operator may work <sup>two</sup> to four furnaces which can be arranged so that, utilizing a common drive, two analyses may be carried out simultaneously with a double combustion equipment.

The object to be analysed is inserted into a quartz tube which is electrically heated by a resistance spiral. The charge is decomposed thermically, is evaporated or sublimates. The products precipitate along a certain length of the quartz tube.

The switching /on and off/ of the heating spirals is accomplished electronically by a time switching device. By selecting the intervals between the individual pulses, the operating time of the spirals can be set from 6 minutes to 7 hours. The selection is carried out by regulating a switch and a potentiometer. In order to prevent mains voltage fluctuations from influencing the temperatures of the individual tubular furnaces, an inductor is inserted in the mains circuit of the time switching device.

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The preheater creates a temperature of approximately 120°C; the double furnace has a temperature of 80°C in the first section and 450°C in the second section. The movable furnace can be set to 600°C - 750°C.

The furnace is designed for connection to single-phase 220 V mains and its total power consumption is 500 W.

#### Technical data :

Length	1120 mm,	height	450 mm
width	500 mm,	weight	25 kg approx.



### Boiler Tubes with Rolled Longitudinal Ribs (Flags).

Tubes with longitudinal ribs for the heating surfaces of steam generators have hitherto been manufactured in such a way that there is welded on to the outer periphery of the tube in the direction of its axis material of rectangular or circular cross-section. This manufacturing method, however, prolongs the manufacturing cycle as well as being expensive and unreliable.

When longitudinal ribs are welded on to the tubes, the tube wall is frequently damaged so that the tube leaks in the welding spot during operation and the steam generator has to be put out of operation in order that the defect may be rectified.

Also the method of shaping of longitudinal ribs by warm squeezing or pressing is not suitable for the manufacture of boiler tubes and is also expensive. This method starts with a rolled tube which is warm shaped in opposite places. For quick and continuous operation this method is too slow, inexpedient and technologically imperfect. It cannot be applied at all for the manufacture of tubes of considerable lengths. Therefore this method of manufacture of tubes with longitudinal ribs is practically not used for the manufacture of heating surfaces of steam boilers.

The above mentioned deficiencies are eliminated by the method of rolling tubes with longitudinal ribs. The principle of the said proposition consists in that the rolling of tubes

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with longitudinal ribs is done on a rolling mill - with advantage on a mill with travelling rolls - so that the feeding of the pre-rolled piece on a mandril into the revolving rolls of the mill is done with a straight movement of the mandril without it being turned. The rolls are so arranged that they form a gauge for the tube and the longitudinal ribs themselves. The shape of the rib, its length and tube diameter depend on the purpose of application, and in this case the gauging is adjusted to the given requirements.

The method of rolling tubes with longitudinal ribs according to the above mentioned proposition changes the existing method of manufacturing technology considerably. By the shaping of longitudinal ribs directly by rolling the manufacturing process is shortened. The former toilsome, slow and expensive welding, done by hand and requiring qualified welders, is no longer necessary. The fact that tubes with longitudinal ribs in their final section are manufactured already in the rolling mill eliminates damaging of the tubes which occurs during the welding on of flags. Thus better quality of the tubes and fewer failures of steam generators are obtained.

As the construction of boilers requires also bent tubes tests have been carried out by bending these tubes with longitudinal ribs in a neutral zone, good results having been obtained.

A great improvement and shortening of the working time has been achieved when expansion joints have been made on flags according to the new technology. Up to now these joints

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have been made by turning with a flame; now they are made by grinding with grinding wheels, using a single-purpose grinder.

Of tubes rolled and arranged in such a way blocks can be assembled directly in the manufacturing works which speeds up the assembly cycle of steam boilers.

The estimated manufacturing costs of tubes with rolled longitudinal ribs will be more than 50% lower compared with tubes with welded ribs. .

By realisation of the production of these tubes by rolling, by a change of the technology of further processing as well as by block assembly of the heating surfaces not only is the production process speeded up and the quality improved, but also the manufacture of steam boilers becomes more economical.

The sole exporter is Ferromet - Praha.

RFU 9-36 R/20 Induction motor for driving of roller type conveyors.

The drive of roller type conveyors for rolling mills is solved either in groups for more rollers, or independently for every roller of conveyor separately. The last mentioned way of how to solve conveyor drives, is now more being employed, since in consequence of any defect of the group drive system, the whole operation of the train must be stopped, whereas at independent drive every conveyor-roller is driven separately, the motor of the roller is in case of defect disconnected from the net-work, without its stopping influencing operation of the rolling system. The remaining rollers continue to convey over the stopped roller without hindrance so that the rolling programme can be finished.

This indisputable advantage of the independent drive of conveyor-rollers is increased by the fact that the induction motors used for the drive of rollers have short-circuited squirrel-cage rotors of a special execution. This does away with the starting mechanism which causes frequent breakdowns of the group drive system.

Since regulating of revolutions has been favourably solved by change of frequency, it is possible to use, in operation of rolling mills where different rolling speeds are required, the drive with separate motor for every individual conveyor roller.

After a whole range of high-speed induction motors for roller conveyors, type RFU - now low-speed multi-pole electromotors have been developed, the construction of which is particularly favourable for drive of conveyor rollers.

The latest low-speed motor is specially constructed for independent roller drive of conveyors in metallurgical works; it is a twenty-pole induction motor, type RFU-36 R/20, 500 V, 11/13 A, 50 N c/s, 275/265 RPM, totally enclosed, with natural

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cooling, rated torque 10/15 kgm, JD = 40%. The motor gives on the shaft by 275 RPM a continual output equalling torque 10 kgm and at JD = 40%, and by 265 R P M an output equalling torque of 40 kgm. It is, with regard to requirements of metallurgical works service, designed for 400 startings, and 135 reversals per hour, with a total moment of inertia  $GD^2 = 25 \text{ kgm}$ .

The motor is of robust construction in view of possible damage in the difficult working conditions in rolling mills. To comply with thermal stress, which is usual in rolling mills, it is provided with class B winding insulation. The terminal board is in a dust-proof cover. To enable easy exchange, motors are now manufactured with hollow shaft for fly-mounted fitting of motor on the roller shaft.

Sole exporters: Foreign Trade Corporation of .....  
Praha.

### COF 220 Voltage Transformer

In comparing the various systems of instrument transformers, next to the output and reliability, also their safety in operation with regard to the amount of inflammable insulating materials which may cause explosion or fire in the case of damage to the insulation are considered.

In order to meet the high requirements made on safety in operation the well-proven design of the 110 kV instrument transformers serves as a standard. These transformers have been designed as a cascade with one magnetic circuit and two insulation sections. Due to their good qualities they have given excellent service both at home and abroad for many years in the past. The design of the 220 kV instrument transformers consists, therefore, of an assembly of two 110 kV insulating transformers arranged one behind the other in a cascade.

In addition to the numerous well-proven features incorporated in this design, this type facilitates the transport of the transformers safely and reliably in two independent parts, even with the oil filling.

The COF 220 instrument voltage transformer exhibited at the Third Exhibition of Czechoslovak Engineering, Brno, gives a rated output of 300 VA in the 0.5 class of accuracy.

By connecting the outlet compensating equipment to the transformer, 120 VA are obtained in the 0.2 class of accuracy. The auxiliary compensating equipment has been designed for installation in the box of the instrument transformer bogie or in a control room in close proximity

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of the measuring instruments. The box with the bogie can be removed, which is of special importance for the shipment of transformers where only limited floor space is available. This aspect is especially appreciated in countries with exceptionally unfavourable transport facilities. These instrument transformers are also relatively easy to assemble. Only one hand operated pulley block (of about 700 kg capacity) was required to install them in 1956 in a power plant situated in the mountainous region of North Korea.

The design of the COF 220 instrument transformers incorporates two 110 kV voltage transformers placed one above the other in a brown porcelain double shed insulator and interconnected by means of the primary winding arranged in tandem, symmetrically divided into four cores, and a special connection winding. The two transformers form an insulating cascade where all members are provided with a compensating winding.

The outlets of the winding are connected with the terminal box, accommodated in the box of the bogie by means of two bushings inside the oil space. The welded box is provided with four suspension lugs. It is closed by a covering plate and aerated by a hole covered with wire netting to prevent the penetration of small insects. The bogie of this instrument transformer has four adjustable wheels so that it can travel in both directions. The earth terminal is in front, at the left-hand side of the covering plate. The terminal box is under the plate which is locked by a screw. The oil outlet is on the wall of the box of the bogie. The

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shed insulators are fastened on the box of the bogie and the connecting part by cast-iron cans, and the joints are sealed with oilproof rubber. The connection is free from cement. The cans are protected from the coronas by rounded guards.

On the top of the upper part of the insulator is the conservator with the primary terminal led through the cover adjacent to the vent on the cover. The shading ring fitted to the conservator aids in correct distribution of the electric field on the surface of the insulator. The secondary winding is on the bottom core of the lower member. The oil level gauge on the wall of the transformer indicates the lowest permissible oil level at 20°C.

The COF 220 instrument transformer has been equipped, as mentioned above, with a diffusion reactance compensating device which enables considerable enhancing of the capacity of the transformer in the given class of accuracy without increasing the production costs and the problems of manufacture. With regard to the total price of the cascade the cost of the compensating circuit is very small.

In striking contrast with most foreign types these instrument transformers are thinner which results in a lower oil capacity (350 kg) as compared with that (600 kg) of transformers of foreign make.

The COF 220 instrument transformer has been subjected to extensive tests without showing the slightest defect at a voltage 20 % higher than the prescribed test voltage for a

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220 kV insulated system and 40 % above the voltage allowed for the same system earthed. The rated transformer load is 120 t. 600 VA according to the class of accuracy. The maximum load is 2000 VA.

The instrument transformers which have been in operation for more than two years, have proved to completely reliable.

Due to their excellent qualities these instrument transformers (1480 kg in weight without oil filling), which are relatively easy to transport and disassemble, will certainly find a wide field of application and a ready market abroad.

Their sole exporter is the foreign trade corporation of STROJEXPORT, Prague, Czechoslovakia.



### Travelling Raking Grate

In principle the grate consists of an endless belt made of several rows of grate bars with overlapping ends, divided into two or more moving systems of grate bars which are independent of one another. The grate bars are arranged in rows which travel at various speeds so that the different speeds of the various rows of grate bars of the endless belt produce a raking effect in the layer of fuel intended for combustion.

The travelling raking grate is designed for both low-grade fuels, which normally find use on raking-type grates, and high quality fuels, normally burned on travelling grates. It is suitable, therefore, for all fuels of any calorific value, ash and moisture content and other properties.

The grate, which has been designed as an endless belt, should, of course, be supplemented with a mechanical or pneumatic stoker so that it may also find use boilers fired with coal dust. The furnace, which is provided with a travelling grate and a travelling, pneumatic or mechanical stoker, offers all the advantages of stoker systems (such as Spreaderstokers) combined with the automatic raking action of grate bars. In this manner, the combustion of baked fuels or those with a high ash content is accelerated or improved.

The new design of the travelling raking grate embodies the advantages of the two systems, viz. the travelling and raking grates. The standard-type travelling grates carry

the fuel through the furnace while the grains of the fuel layer do not change their position with regard to one another so that the layer is not raked. The design of this type of grate is well suited for graded fuels of maximum heating value. Its advantage consists in that the grate bars do not suffer from burning even with fuels of the highest calorific value, and can be cast, therefore, of standard fire-proof cast-iron. All grate bars can be checked or renewed in operation which adds to the operating reliability of the boiler unit.

Another basic type of grate are raking grates, irrespective of the design of the grate. Their full merit lies in permanent and efficient raking of the fuel and the high economies which they provide in utilizing low-grade fuels or fuels with a high ash content. The grate bars of the raking grates of standard design are, however, exposed in operation to the permanent effects of the combustion heat, during their straight and reversible movement. These effects are more or less pronounced according to the place in which the grate bars are accommodated. They suffer, therefore, from rapid wear through burning. The grate bars are difficult to check in operation. Their replacement in operation is practically impossible so that the boiler must be put out of commission.

The travelling raking grate, which is a novelty, combines the advantages of the two types. The grate bars move with the fuel in the endless belt without being permanently

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exposed to the unfavourable effects of heat. They are self-cleaning during operation, though only a negligible quantity of siftings falls through the air spaces so that a permanent clearance between the grate bars and a constant combustion rate are ensured. All grate bars can be successively checked or renewed in operation without putting the boiler out of commission. For the manufacture of grate bars special alloy steels are not required.

Due to its raking ability the travelling grate is suitable also for the combustion of fuels with a high ash content, while the combustion of fuels of a high calorific value is accelerated. In no case, however, does a change of fuel affect the safety of operation as the use of the raking grate is no limited to the combustion of fuels of a certain kind and properties, as is the case with the two basic types of grates.

The travelling raking grate is used with grate bars moving away from the grate hopper or in the opposite direction. According to the selected direction of the grate belt movement, i.e. the type of the fuel stoker, the grate bars are arranged in the belt so that their suspended end follows the movement of the grate. The grate is also suitable for higher temperatures of the bottom air as well as to all types of attachments used for increasing the rate of combustion. The raking efficiency of the grate, easy inspection of the grate bars, their easy replacement and arrangement in an endless

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belt and other features enable these attachments to be used to full advantage.

Other design features of this grate, such as the automatic discharge of siftings and the infinitely variable control of the movement of the belt, are especially suitable for the automatic boiler control.

The travelling raking grate can be manufactured in sizes which are normally used even for other types of grates. The height of the grate complies with the dimensions of travelling grates of standard design.

The sole exporter of this grate is the foreign trade corporation of TECHNOEXPORT, Prague, Czechoslovakia.



### Electrical timekeeper equipment.

Many interesting timekeeper devices are on show at the engineering exhibition in Brno. Their operation is based on the utilization of polarized pulses. This system requires the minimum of maintenance when applied in actual practice, is absolutely reliable in operation, and works without any additional correcting devices whatsoever for the repeater /secondary/ clocks. Two types of master clock are manufactured in Czechoslovakia: one with a  $3/4$  seconds pendulum and one with a 1 seconds pendulum. Both types use precisely designed Graham's escapements which, in connection with the compensated pendulums, ensure high precision in timekeeping. The clockworks proper can be detached easily from the lower parts of the mechanisms, which are the electrical parts of the master clocks.

For time dependent signalization, visual or acoustical /e.g. for the signalling of the beginning and end of work shifts, or periods of tuition, or for the switching of public illumination, etc./, the master clocks are fitted with signal mechanisms mechanically geared to the clockworks. The signal mechanism is visibly mounted below the face of the clock. Its main part is the signal disc which is divided into 5 minute sections over 24 hours for the selection of the required signals by the insertion of stubs. The master clocks with signal mechanisms are available with single-circuit and double-circuit devices, with disconnecting facilities for Sundays, and can be arranged for special signalling programmes for Saturdays or for any other day of the week.

If a permanent recording of the time is required /e.g. for checking the time of arrival and departure of workers/ for further reference at some later date, it is advantageous to utilize recording instruments which are either driven directly by the master clock or are linked mechanically to a repeater /secondary/ clock which itself is controlled by pulses transmitted by the master clock.

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The most commonly used type of recording clocks is the one utilized for the supervision of workers. It is of sturdy design and records in two colours arrivals /correct or late/ and departures /premature or regular/ on cards which are designed for use over one week, a fortnight, a month, or which can be used for the recording of shifts. The displacement of the clock cards to the sides as well as in the vertical direction is fully automatic.

A recording clock of novel design - type DK 3 - has been evolved for the purpose described. It is mounted in a spray-lacquered metal case which is fitted with a lock; the clock is composed of a spring-driven and electrically governed clockwork, the printing device, and the card shift mechanism. The clock is governed by polarized pulses transmitted by the master clock at one minute intervals. The face of the clock is 90 mm x 90 mm and is fitted on the front wall of the case. The clocking lever which actuates the printing mechanism is on the left-hand side wall of the clock. The time is recorded automatically in the appropriate column and on the correct line of the card. The changing over of the recording from morning to afternoon, from day to day, and the exchange of the printing colour /from blue to red/ are fully automatic also. If there is no master clock available or connection to it cannot be carried out, an independent governing mechanism can be used which is connected to mains of 220 V or 120 V, 50 c/s.

Another interesting novelty is the mechanical stop clock - type FS 1 - which is specially designed for use at football matches. It measures the duration of the game and is driven mechanically by a spring after being wound up with a key. The pointer moves over a 200 cm face and can be started, stopped and reset to zero. The stop clock is fitted into a metal case provided with a handle for carrying and secured against the penetration of rain. On the sides of the spray-lacquered case are four hooks for hanging the clock on a special bracket which

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supports the clock face. In the front wall of the case is an opening, normally covered with a lid, through which the clock can be regulated if necessary. The pointer can be fixed on its shaft which protrudes through a small window in the face plate, and tightened with a key. The pointer moves in 1/2 minute steps around the face and stops automatically when it reaches the 50th minute. When the resetting chain is pulled, the pointer returns to zero. An interesting feature of this clock is an extra spring case actuated /wound up/ automatically. Sturdy design and expert workmanship ensure long service life of this stop clock.

In order to deal with widely spread networks of repeater /secondary/ clocks, the master clock can be supplemented with an automatically operating device which makes possible the application of any number of clocks. Many large time-keeper centres thus formed have been already installed utilizing the plentiful experiences gained.

The equipment of an up-to-date timekeeper centre is as follows: The centre is fitted with a main master clock and a spare master clock. The latter takes over automatically should a failure occur in the first clock, or whenever the first one is stopped for reasons of maintenance /cleaning, regulating, etc./, without causing any time error in the indication of the repeater clocks. The two master clocks are synchronized so that a difference between their indications cannot occur. The minutes pulses /or the seconds pulses - as appropriate/ are supplied to repeater relays which govern groups of repeater clocks. The lines which connect the repeater /secondary/ clocks to the centre are checked automatically for short circuits and earth leakages. Also the power sources are checked continuously and if the voltage drops below a certain level or when there is a failure of the mains, a spare source is connected automatically. The number of repeater clocks which can be connected is virtually unlimited.

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As well as clocks, the operation of which is based on polarized pulses, also other timekeeper devices are manufactured for various applications in many branches of industry. Clockworks for driving recording instruments, frequency control sets for power generating plants, stop clocks for industrial purposes and for use in laboratories or in broadcast studios, time dependent mechanisms for industrial control devices and many other instruments are included in the list of products currently manufactured.

Time measuring devices designed specially for use at ice hockey and basket ball matches deserve to be mentioned. They are adapted to the international rules for the particular games and already have proved their value at many sporting events. The basket ball clock is portable and measures not only the duration of the game but also of the rest periods. It signalizes automatically when there are three minutes left before the end of the match and stops automatically at the end of the game. Repeater stop clocks are designed for open air mounting or are portable and can be placed on a stand inside a gymnasium.

Export is dealt with by KOVO, Foreign Trade Co., PRAGUE.

### Laboratory instruments for pH measurements in industry.

For measuring of pH values in industrial plants in frequent cases an equipment is needed which is independent from the mains. Difficulties are encountered particularly where there is no electric current installed /sewers, tanks, outlets/ or in such places where a connection of a measuring instrument would form a hindrance or an undesirable extension of the measuring procedure or where it could challenge the safety of the operator /in a damp medium, pH measurement of mine waters, etc./. Taking samples and their measuring in the laboratory is not always sufficiently rapid and easy.

The only dependable method of determining the pH values in such cases is based on the principle of a perfectly reproducible system of electrodes, i.e. the electrometric measuring of pH values. From the known electrode systems that consisting of a glass electrode in conjunction with a reference calomel or silver-chloride-silver electrode is best suited for industrial use.

A good solution of a battery-type portable pH meter is represented by the Czechoslovak instrument "Multobat", fitted with an immersion-type electrode system housed in an all-metal casing.

The single conventional-type electrometer tube is energized by built-in dry-cell batteries. The instrument including the batteries is mounted in a suitable wooden case of a simple shape fitted with a leather strap, the length of which is adjustable as required. Checking of the battery voltage and setting of the energizing values is effected by means of a built-in microammeter and the corresponding potentiometers. The scale of the microammeter is graduated directly in pH values from 0 to 14. The scale holds true, of course, only for a temperature of the measured solution of 18°C. For values ascertained at different temperatures a suitable correction has to be made.

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The electrode system consists of a rugged glass electrode made from a high-conductivity glass and a reference electrode Ag-AgCl. The system is mounted in a metal casing and closed by means of a protective vessel containing some pure water. This enables the electrode system to be moved about and stored without risk of mechanical damage or drying-up of the glass electrode.

The dimensions of the instrument are small /approx. 230 x 160 x 140 mm/, the weight is low /3 kg/. It is easy to operate and versatile in use. In practice the "Multobat" has found a wide range of utilization not only for measuring of pH values in open tanks or sewers, but also in the nature for research work in the field of mineral water sources, for measurements both in open water streams or in probes.

Due to its simple operation, small dimensions, versatility of use and independence of mains power supply, the "Multobat" represents an instrument type of Czechoslovak make capable to meet all demands expected from a direct-reading portable pH meter.

Sole exporters: KOVO, Foreign Trade Corporation, Prague.

Spencer's Diaphragms

For the internal protection of small motors and appliances, thermostats of suitable design have been used abroad in recent years which automatically switch off the current when the temperature of the winding exceeds the permissible limit. These thermostats should be placed, however, directly in the winding or its close proximity so that minimum thermal inertia and prompt reaction to a rise in temperature above the permissible limit are ensured.

A two-metal diaphragm is the active element of these thermostats which instantaneously switches off the motor at an excessive temperature and, without the use of auxiliary devices, returns to its original position when it cools down. This is effected either automatically or by pressing a push-button, as is the case with electrical hand tools and washers where the motor or electrical appliance must be prevented from automatic restarting.

Messrs Spencer Thermostat Co. have been especially successful in introducing these diaphragms for the thermal protection of motors and appliances. These thermostats, which are of the most elaborate design in U.S.A., are also known by this name in the technical world.

The thermostat must be, of course, of minimum size so that it can be inserted in the winding. At the Third Exhibition of Czechoslovak Engineering, Brno, some thermostats are displayed.

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These diaphragms which can be used directly (i.e. without the use of electromagnet contactors) are especially well suited for the thermal protection of small single-phase motors of up to about 0.75 kW. They are very small indeed, being only 13 mm in dia. and 4 mm in height. They are cast in "UPON", which resists temperatures of up to 150°C. The switching off temperature of these diaphragms is 100°C, corresponding to the A insulation class; they can be switched on again at a temperature of 60°C.

These in-built thermostats can be perfectly adapted to the qualities of the protected motors and other electric appliances so that their reliability and field of application are still further increased.

Their sole exporter is the foreign trade corporation of STROJEXPORT, Praha.



### Optical Vibrometer.

The Optical Vibrometer serves for measuring of vibrations, ascertaining their causes in order to enable them to be removed in ordinary industrial production and, in addition, in the development of new machines. It is used for checking the vibrationless run of rotary machines and their fundamentals, for operational of dynamical balancing of rotors and for measuring of minute displacements.

#### The measuring system consists of the following parts.

- 1/ optical vibrometer;
- 2/ rotary-type contactor with a stand
- 3/electrical outfit/ placed in a transport case/.

The sources of light are energized by a dry-cell battery which enables a broad range of utilization in the technical practice.

#### Description of the function.

The Optical Vibrometer can be operated as a relative-type pick-up of vibrations or displacements when fixed to a stationary / motionless/ body with regard to which the vibrations or the displacements are measured. In this arrangement the Optical Vibrometer is capable from zero frequencies upward.

When the instrument is used as an absolute-type pick-up of oscillations, the vibration is measured by applying a testing point to the object to be measured or by fixing the instrument to the point to be measured.

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In this arrangement the instrument is used for measuring of vibrations the frequencies of which are higher than the own frequency of the vibrometer pick-up system.

The instrument can also be employed as a double-mass pick-up of oscillations by means of which - after suitably setting the own frequencies of the pick-up-system- a suppression of periodical and oscillating movements can be attained which use to be superposed on to an oscillating movement produced by unbalanced parts and which make an accurate measurement of the magnitude and the phase of the oscillations so difficult.

The range of vibration measurement is limited coarsely by the two own frequencies of the system.

In conjunction with a rotary-type contactor the Optical Vibrometer can be used for measuring the phase of mechanical oscillations at any alternative adjustment of the instrument.

Characteristic features of the Optical Vibrometer are: a relatively simple design, easy operation and a broad range of utilization in all instances where it is necessary to measure the vibrations, to ascertain their causes in order to remove them and, in addition, to check the vibrationless run and to balance the rotating machine parts.

Dimensions of the instrument: length 410 mm, width 290 mm, height 115 mm.

### Ultrathermostat

The Ultrathermostat has been designed for maintaining a constant temperature of a tempered liquid in laboratory work. It can be used for flow-type appliances or, if necessary, small laboratory instruments can be put directly into the thermostat vessel. As a tempering liquid only a high-viscosity oil can be employed.

The Ultrathermostat can be used within a temperature range of from  $-30^{\circ}$  up to  $+150^{\circ}\text{C}$  with an accuracy of  $1.10^{-2}\text{C}$ . The instrument can serve as an independent unit or in conjunction with other laboratory instruments, as e.g. a viscosimeter, etc.

The instrument consists of the following main parts:

- 1/ a vessel for the liquid to be tempered, about 9 litres in volume: the vessel is fitted with a perfect thermal insulation. The cover of the vessel incorporates
- 2/ an electronic control equipment for the control of the heating elements;
- 3/ a motor with a pump - the pump is intended for whirling the tempered liquid;
- 4/ a set of checking and contact thermometers.

The instrument is suitable for tempering 9 litres of liquid; it is fitted with 2 heating elements having a total consumption of 1600W and with an auxiliary heating element / consumption 900 W/. The electric motor for driving the pump has current consumption of 120W. The constant temperature is maintained by means of a thermometer and an electronic relay. An improvement is based on the principle of whirling the liquid by the pump pressure.

### Operation:

The liquid to be tempered is filled into the instrument after being warmed up by means of the pre-heating element. After a certain temperature has been attained, the pump is started and the electronic control equipment is switched-on. The required temperature is controlled and maintained by the electronic control equipment by means of a preset contact thermometer. If necessary, a flow-type water cooling can be applied in order to keep the temperature at the required value.



### Statically-dynamical Strain Gauge.

The complete unit - a statically-dynamical bridge- enables statically-dynamical strains to be measured simultaneously in two points. The instrument can be energized from a 220 V A.C. 40 to 60 c/s mains or through a suitable transformer from a 12.6 up to 25.2 V D.C. battery.

The Strain-gauge unit consists of the following parts:-

- 2 independent strain-gauge bridges,
- 1 energizing oscillator / common /,
- 2 independent three-stage amplifiers,
- 2 independent discriminators
- 1 common energizing equipment

Due to the ever increasing use of electronic measuring instruments in the measuring technique the old methods of mechanical and optical measurement necessarily are being rapidly displaced.

Particularly in the measurement of strain in machinery structures the resistance strain-gauge is by far superior to any mechanical strain-gauges hitherto used.

Another advantage of the instrument is that it can be used both as a pick-up of statical strain and also for ascertaining of dynamical strains within a broad range of frequencies and, at the same time, for recording these strain forms. Measurements can be effected in places which are accessible with considerable difficulties only and where mechanical strain-gauges by no means can be applied.

Technical data: length 485 mm, width 330 mm  
height 225 mm, weight 25 kg.

The reference voltages are changes-over for each range simultaneously with the choice of the individual range. The reactance-balance is built-in; the sensitivity variations with regard to the reference voltages due to mains voltage variations within a range of  $\pm 20\%$  are equal to  $\pm 2\%$ .

Carrier frequency :  $f_0 = 5000$  c/s

Voltage on the strain gauge bridge:  $E_m = 15$  V

Current in the strain gauge pick-up : 12.5 mA.

Type MM 250 Mortar Mixer and Type C 501 Concrete Mixer -  
Novelties of the Czechoslovak Building Industry

Mixing of mortar in larger quantities is the purpose of the exhibited type MM 250 mortar mixer which dispenses with the hitherto used mixing of mortars in concrete mixers. The applied principle of forced mixing, i.e. rotation of the mixing equipment while the drum stays immobile ensures proper mixing of the mortar mix.

The function of the mixing equipment is fulfilled by the shaft which passes through the mixing drum and is provided with mixing blades. The mixer mounted on a three wheel carriage with rubber covered wheels is easily transportable. Its light weight has been attained by means of using the frame with the immobile mixing drum as load bearing structure and undercarriage at the same time.

A hopper sliding along a pair of guides effects filling of the mixer. The drive is transmitted from a gear box by means of a roller chain. Further great advantages are also automatic batching by means of a water batch meter, easy exchange of the mixing blades, speedy emptying of the mixing drum and a reliable output of 4 m<sup>3</sup> per hour. The useful volume of the mixing drum is 250 litres, the speed of the mixing shaft 23 r.p.m. and the output of the electric motor 4.2 kW at 550 r.p.m. The last mentioned can be replaced with a 10 HP internal combustion engine having 1500 r.p.m.

For particularly thorough mixing of concrete mix with a low water cement ratio, such as the mix used in the production of precast elements the type C 501 concrete mixer is used, which

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is supplied in mobile or stationary execution. The applied system of three types of blades, viz. mixing, loosening and wiping blades, ensures the optimum mixing of the concrete mix. The mixer will prove valuable also in other branches. The useful volume of its mixing drum is 500 litres and its output 8 m<sup>3</sup> per hour, - the speed of rotation of the mixing drum is 8 r.p.m. and the speed of the mixing blades 31 r.p.m.

The sole exporter of both these novelties as well as of all other machines for the construction is the Czechoslovak foreign trade corporation of STROJEXPORT of Prague, Czechoslovakia.



### TOWER CLOCK

The tower clock has a complete tower clockwork of the type 230 B, striking quarters, halves, three quarters and the hour, a set of translucent or non-translucent dial and a pair of hands.

This type of tower clock is suitable for towers and buildings which have dials at a height of 15 to 20 metres /46 to 61 feet/. For higher buildings and towers it is necessary to choose a larger size of dial at the ratio 1 : 10.

The striking of the clock is effected by means of church bells or cymbals which are supplied separately.

The clockwork must be placed in a protective case made of wood or metal which the customer will have made on the spot according to a drawing which will be placed at his disposal.

The necessary preparatory work for mounting the tower clock: the making of apertures for dials /bricklayer's work/, the laying on of electrical installation for the three-phase electric current and sundry carpenter's work must all be done prior to the mounting of the tower clock.

### Types FB 3,75 and FB 7,5 Concrete Finishers .

Functionally far better and more effective than the types hitherto used in this country is the exhibited type FB 3,75 concrete finisher, intended for the working of concrete mix in the construction of concrete roads, airfield runways, etc. The machine, moving on a rail track, follows the concrete spreader. Being mounted on a four wheel carriage, the finisher can be adjusted for three working widths. The three principal parts of the finisher are the spreading beam, the vibration beam and the finishing beam, all of which are lifted and lowered hydraulically. The finisher is driven by means of a well proven Diesel engine of the SKODA 2S110 type. The machine is controlled with a system of control hand levers and foot tressles. The vibration beam carries two vibrators which, together with the spreading and finishing beams, ensure a smooth and good surface of the concrete mix. The finisher weighs approximately 5,000 kg, its maximum working width being 3,75 m.

Similar in construction is also the larger type FB 7,5 concrete finisher. It has a larger working width, viz. 7,5 m, a larger number of feeds of the spreading and finishing beams, a higher frequency of the vibration beam, which carries 6 vibrators, and a weight attaining approximately 7,000 kg, etc.

The sole exporter of the Czechoslovak made concrete finisher is the Czechoslovak foreign trade corporation of STROJEXPORT of Prague, Czechoslovakia.



## MEOPTA ENLARGERS .

The MEOPTA small-size enlargers are manufactured as oblique-red types, the larger-size enlargers being fitted with three-red stands.

The design of the oblique-red type enlargers, which in many cases is being imitated partially or completely by some foreign manufacturers, is characterized by the advantage of a perfect stability of the apparatus, to say nothing of the simplicity and dependability of the friction mechanism utilizing the reinforcement fin of the apparatus carrier tube.

As regards the three-red stand, it is hardly possible to design a more stable construction which would better suit for large-size enlargers, and which, at the same time, would be unobjectionable from the esthetical point of view.

The Czechoslovak Enlargers are characterized by another advantageous feature based upon their versatility, as e.g. the possibility of tilting and projecting in the horizontal position, /except for the enlargers fitted with automatic focusing/. In addition, numerous accessories are supplied with the enlarger. The large-size enlargers can also be used for making perfect enlargements from negatives made on cine film. After being suitably supplemented with special accessories, the enlargers can substitute a number of small-size apparatuses which is very advantageous particularly in laboratories with limited floor space.

For use with black-and-white or colour 35-mm cine film particularly well suited is the AXOMAT Enlarger. This apparatus is available according to the customer's choice either for black-and-white photography only or with an adapter for the MEOPTA compensating colour filters 7.5 x 7.5 cm in size. The adapter can be easily attached to the enlarger by means of screws.

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Another improvement is represented by a new design of the lens which is equipped with a snap-in diaphragm ring.

The oblique red is fitted with a scale indicating the degree of enlargement. The number set is read off the lower edge of the carrier mount. In the "Directions for Use" tables are to be found which indicate the respective linear enlargement when the sensitive paper is laid directly on to the base-board.

The new OPENUS II Enlarger for enlarging from a size of 6 x 6 cm and less shows also many advantages of both technical and commercial nature. The standard-type apparatus is suitable for black-and-white photography only. As special accessories both the adapter for compensating colour filters and a multiplier for the two kinds above mentioned are available. The OPENUS II Enlarger can be used for making outcuts from glass plate negatives 6.5 x 9 cm in size. As a special supplementary equipment for colour negatives an easel without cover glasses is available, the easel being also fitted with a slit-focusing adjustment.

These well-equipped enlargers can also be used for making various reproductions. The conventional ground-glass with a magnifier has been replaced by a slit-focusing adjustment.

A significant novelty in this line is the MIKROMAX, fitted with an efficient NIKKOR f/3.5, F = 35 mm lens and a slit-focusing type easel suitable for MIKROMA sizes. This apparatus has all constructional advantages of the well-proven AXOMAT Enlarger.

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Another MEOPTA novelty is the MAGNIFAX II Enlarger. It has been designed for enlarging from negatives 6.5 x 9 cm and less in size; it is fitted with an efficient BELAR f/4.5, F = 105 mm lens, a snap-in diaphragm, slit-focusing type easel, a new kind of masking smaller sizes by shifting the masking strips in the easel.

Sole exporters: KOVO, Foreign Trade Corporation, Prague.



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### Photographic Cameras at the Brno Exhibition.

The FLEXARET IV, nowadays the most popular photo camera, undoubtedly keeps abreast with any reflex camera of the renowned world makes. It is a roll film camera for 12 pictures 6 x 6 cm in size. As a taking lens serves a coated BELAR four-glass anastigmat,  $f/3.5$ ,  $F = 80$  mm, corrected for colour photography. The camera is equipped with a PRONTOR SVS central-type five-laminate shutter incorporating a flashlight synchronizer for various kinds of flashlight, with exposure times B, 1, 2, 5, 10, 25, 50, 100 and 300, including the delayed action mechanism. The release is interlocked by the rewind mechanism, thus preventing double-exposures to be made on a single frame. On the other hand, trick shots can be accomplished at will by gradually exposing two or more pictures on a negative directly on the shutter. Advance of film is coupled with the automatic film counter.

However, even this in every respect well equipped camera does not mean the "last word" of the MEOPTA WORKS. Another new model of this type is the FLEXARET IV A Reflex Camera. In principle, the technical equipment of this camera is similar to that of the foregoing type, except for the difference that with the new camera 36 pictures 24 x 36 mm in size on cine film can also be made. The camera can be adapted for use with cine film in a very simple way which can easily be accomplished by every amateur. It is sufficient to insert a cine film guide into the camera and put adapter pivots upon the pivots of the top spool. It is self-evident that the correspond-

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ing parts of the camera are also suitably adapted for use with cine film, i.e. the focusing hood, the hood front lid, for open-frame viewing and the automatic film counter. Besides this, the rewind knob is adjusted so as to enable the kind and sensitivity of film just used to be recorded.

A new apparatus - the FLEXARET V Reflex Camera, which will be displayed for the first time at the IIIrd Czechoslovak Engineering Exhibition in Brno, follows, in principle, the well-proven conception of the foregoing type, i.e. the FLEXARET IV A. Hence it can be used both with roll and cine film, the outfit of the camera being identical with that of the above mentioned type. In addition, however, it incorporates several significant improvements /as e.g. a more attractive appearance, improved release mechanism, rewind of film coupled with cocking of the shutter, etc./.

All types of the FLEXARET Reflex Camera are supplied with a comprehensive set of accessories, as e.g. an ever-ready leather case, a sunshade, colour filters, adapter lenses, etc. It is really worth while to see the whole range of other Czechoslovak products of the photo-cine branch: from the motion picture cameras and cine projectors up to the enlargers and supplementary equipment for the dark rooms.

Sole Exporters: KOVO, Foreign Trade Corporation,  
Prague, Czechoslovakia.

A New, Highly Interesting Line of Czechoslovak  
Internal Combustion Engines on Show at the Third  
Exhibition of Czechoslovak Engineering in Brno.

Among the important novelties which the Czechoslovak crude-oil engine industry will put on the market in the course of the years 1957 to 1959, the following types may well be considered the most interesting: the type 1 D 80 and 1 - 6 D 110 two-stroke engines, the type 1 - 2 TS 120 air-cooled four-stroke engines, the re-designed type 6 S 160 PN, K 12 V 170 DR and 6 SL 275 PN super-charged engines, the complete marine engine sets with outputs ranging from 9 to 235 H.P. and the fully automatic Diesel sets with outputs of up to 150 kVA. Very notable improvements have been achieved furthermore on the type 1 - 2S 100 SLAVIA engines by means of modifications in which the aim is to give the product a more attractive, appearance, to decrease the weight and to facilitate manipulation.

The Type 1 D 80 Air-Cooled, Two-Stroke Crude-Oil SLAVIA  
Engine.

The smallest unit produced so far in Czechoslovakia, reaching world standards with its parameters, is the type 1 D 80 valveless two-stroke, single-cylinder engine with a distribution manifold and box-type scavenging equipment. This engine can achieve an

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output of from 3 and 6.5 H.P., at 1,000 and 2,200 r.p.m., respectively. Air cooling has been incorporated successfully, in its design by means of an axial fan, driven by Vee-belt off the free end of the crank shaft. The parameters of the engine /bore 80 mm, stroke 90 mm, weight approximately 95 kg, fuel consumption of 200 grammes /H.P./hour and oil consumption of 5 grammes /H.P./hour/ prove that excellent results have been attained notwithstanding the overall simplicity of the engine design. In comparing it with similar engines of foreign make the definite advantages and superior features of this smallest Czechoslovak engine become all the more evident. For reasons of standardization and interchangeability of parts the front engine lid /including regulator/, and the operating mechanism of the injection and lubrication pump are identical with those of the type 1 D 110 engine. The cylinder liner pressed into the ribbed aluminum jacket is of special cast-iron which ensures a long service life. The aluminum cylinder head with a cast-in chamber of cast-iron, which latter is provided with a quick-match device to facilitate starting in cold weather, has cleverly conceived ribbing calculated to afford a maximum cooling effect. The built-up crankshaft runs in anti-friction bearings. The wide range of operating speeds of the engine, its low consumption of all materials required for operation, its simple handling and its outstandingly reliable performance prove that still another excellent unit has been added to the already rich assortment of Czechoslovak

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The firm of STROJEXPORT - PRAGUE is the exclusive exporter of these Czechoslovak engines.

# The New S L A V I A Two-Stroke Engines of the D 110 Series.

Another novel design which the Czechoslovak crude-oil engine industry is putting on the market are the two-stroke engines of the D 110 series, water - as well as air cooled units of 1 to 6 cylinders, with fuel injection into the spherical turbulence combustion chamber arranged in the cylinder head. The single-cylinder unit has been developed in two alternatives, one designed as a tractor engine for agricultural tractors for light farm work, the other engine being designed for stationary operation. In view of the required perfect equilibration the first alternative design uses rotary counter-weights, while off their shaft is derived the drive for the rotary slide valve which controls the air suction into the engine crank case. The attained output of 18 H.P. at 1,800 r.p.m. with a box-type scavenging and distribution manifold is quite remarkable. The stationary unit, equipped with a valve flap instead of the rotary slide valve, reaches an output of 14 and 16 H.P., at 1,500 and 1,800 r.p.m. respectively. Box-type scavenging will be applied in the design of the twin-cylinder engine as well which is now in the stage of development and for which an output of 28 to 32 H.P. is assumed at 1,500 r.p.m. On multiple-cylinder engines Roots-type positive blowers are being used for scavenging and these engines reach an output of 25 H.P. per cylinder at a speed of 2,200 r.p.m. The equally successful use of

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a new type of hydraulic regulator and of a flange-type design of the engine crank case, the utilization of the greatest versatility of design making the reconstruction of a water-cooled unit into a unit with cooling by air possible while using only the minimum number of variations of details, the low weight which amounts to no more than 6.3 kgs per H.P. with four-cylinder units and the very moderate fuel consumption of approximately 190 grammes /H.P./ hour all serve to prove that the Czechoslovak crude-oil engine industry has also in this case succeeded with this engine series which covers the field of required outputs ranging from 10 to 300 H.P., using engine designs with a single and up to twelve cylinders, in enriching its range of world-renowned products by another outstanding type. In comparison with the very modern air-cooled DEUTZ engines /and notwithstanding the fact that the D 110 series is cooled by water/ these engines have a weight which is only negligibly higher, approximately by 0.4 kg per H.P., in spite of the heavy flywheel provided for alternator operation. Their advantageous properties will ensure, no doubt, the widest utilization of these engines in highway as well as in marine transport, in the tractor industry, and as stationary units for driving alternators, pumps, compressors, drilling sets, building machines of all descriptions as well as other machinery equipment. The firm of S T R O J E X P O R T - P R A G U E is the exclusive exporter of all these engines.



#### SKODA 706 ROK Dust Collector Truck

The Skoda 706 ROK dust collector truck holds a place of no minor importance in the province of up-to-date municipal sanitation. Without these efficient vehicles it would be hard to collect all dust and solid refuse from households, thus maintaining the streets, squares and houses in clean condition. Moreover, the entire procedure of removing the dust, ashes and refuse is absolutely hygienic and inoffensive not only for inhabitants of houses and passers by who were formerly exposed to the dust, but also for the crew of the vehicle.

The Skoda 706 ROK dust collector truck is built on a specially modified and reinforced motor bus chassis powered by a four stroke, water cooled, six cylinder Diesel engine.

The gearbox has five forward speeds and one reverse. The rear face of the gearbox carries the auxiliary drive housing, providing the drive for the auxiliary air compressor and the collector drum drive housing. The twin plate clutch is amply dimensioned to enable frequent halts and short distance runs of the vehicle.

The sturdy design of the chassis assembly ensures long life and service safety. The brakes incorporate three independent brake systems: a pressure air brake, a hand brake and an engine brake.

The tram-bus-type cabin is exceptionally spacious, affording accommodation to a six-member crew including the driver. It is an all-steel, two door construction, mounted on the chassis frame by means of rubber mountings / silentblocks/. Ventilation is effected by means of drop windows and vent flaps arranged in the roof; hot air heating is provided for cold weather operation. Thus every possible comfort is ensured the personnel.

The principal component of the dust collector truck is a cylindrical collector drum, housing spiral shaped conveyor faces. Its front end is attached to the chassis by means of the ball joint of the front bracket, its rear end being supported by the four rollers of the rear bracket. The drum revolves round its horizontal centre line in either direction as necessary, being driven by the power unit incorporating the drive pinion and the tube crown bolted to the bottom of the drum. The drum, made of high quality sheet steel, is protected to a certain extent against corrosion by the greasy matter contained in the refuse. Its life of six years can be still further increased by careful servicing.

The revolving drum shakes and compresses the refuse to a smaller volume, thus enabling more refuse, i.e. 14 to 16 m<sup>3</sup> or 494 to 565 cu.ft., to be collected within the same space than by mere pouring.

The rear cover of circular shape is fitted on its rim with a gasket ensuring dust-free operation of the collector truck. The top part of the cover is provided with a filter ensuring breathing of the drum interior and consequently preventing any possibility of explosion.

The cover is operated by means of pressure air, controlled by the driver by means of a hand lever. Owing to this arrangement, the driver need not leave the cabin when refuse is being collected. Prior to opening, the cover is automatically unlocked and, after closing, locked in position again. The control lever is locked in the respective position, thus preventing unwanted opening of the cover.

The pneumatic dust bin conveyor located on the rear cover is extremely easy to handle. It incorporates two air cylinders and a four-way air pressure governor operated by a hand lever. Pressure air supplied from the auxiliary air compressor

is conducted through the pipe line, by way of the air reservoirs, to the air pressure governor, from where it passes into the lifter and then into the shaker cylinder.

To eliminate lubrication of the ram cylinders, the pressure air line incorporates a built-in lubricator for air oiling.

The suspension of the dust bin is effected by means of a special support, driven along the shaker slides by means of the lifter cylinder. The shaker cylinder is attached to the cover and causes the shaker slides to be swung, thus causing the dust bin to be conveyed to the shaker. This set-up enables an exceptionally low loading height of approximately 1000 mm or 3'3 1/3" above the ground.

The body housing the collector drum and the units ensuring its revolving as well as the cover control is of extremely advantageous design, ensuring a smart appearance and trouble-free operation of the vehicle. Suitable caps and covers arranged at the necessary points enable inspection and lubrication of all moving parts as well as access to the batteries and fuel tank, thus making possible easy and simple servicing and routine maintenance of the entire vehicle assembly.

The advantageous design and sturdy construction of the Skoda ROK 706 dust collector trucks are features ensuring smooth dust collection and emptying of the drum without tipping, thus enabling high efficiency. Perfect filling irrespective of the street gradient or of the longitudinal angular position of the vehicle enables 100% exploitation. Accordingly, dust collector trucks of this design can rival foreign products. They comply with all requirements to be met by modern dust collector trucks; moreover, their low loading height is up to now unrivalled.

Simple operation and high economy regarding the effort of the operators which is minimized by the lowest possible loading height ensure a speedy working cycle which combined with the low

output of the engine required for both collecting and emptying procedures, complete the picture of a perfectly economical dust collector truck.

Owing to these features, the dust collector trucks have become excellent export goods. They are supplied mainly to the German Democratic Republic and to Hungary.

They have been also shown and demonstrated at exhibitions in Bulgaria, Yugoslavia, Poland, Rumania and Greece attracting great attention in all these countries particularly due to their automatic emptying of the dust bins, simple and easy handling and servicing.

#### Technical Data:

Engine power output	135 HP at 1750 RPM
Maximum speed	55 km or 32.2 m.p.h.
Wheelbase	5000 mm or 16'5"
Minimum turning circle, dia	22.6 metres or 74.15 ft.
Tyres, front and rear	12.00 - 22"
Gross weight of chassis	6100 kg or 1543 lbs
Number of seats	1 + 5
Collector drum capacity	10 m <sup>3</sup> or 353 cu.ft.

Filling capacity of loose refuse with regard to compression 14 to 16 m<sup>3</sup> or 494 to 565 cu.ft.

Curb weight of vehicle	16,800 kg or 37,038 lbs
Permissible axle pressure, front	6000 kg or 13,228 lbs
Permissible axle pressure, rear	10,800 kg or 23,800 lbs
Overall length of vehicle	8700 mm or 28'6 1/2"
Overall width	2500 mm or 8'2 3/5"
Overall height	3200 mm or 10'6"

Number of collected dust bins	150
Emptying period per dustbin	6 seconds approximately
Filling period of collector drum	1 hour approximately
Emptying period of collector drum	5 minutes approximately

Sole exporter: MOTOKOV Foreign Trade Corporation P r a h a

The Š K O D A 706 RT

The First " TRAMBUS "-Type Automobile of Czechoslovak Make.

Newcomers to the world's highways are the motor trucks of " TRAMBUS " design. This is a new idea in motor trucks combining the usefulness of heavy service trucks with the comfort of other vehicles. As so often in the past the Czechoslovak automobile industry has not lagged behind its competitors abroad and has brought out a new model of the service-tested " 706 " series of automobiles. The ŠKODA automobile works has designed a trambus, the ŠKODA 706 RT model, which, in comparison with the earlier models, has a shorter and narrower undercarriage, a modification affording considerably increased manoeuvrability of the truck, especially in a curve. The works has also been successful in reducing the dead-weight of the car and, by re-arranging the front part of the truck body, improved the field of vision of the driver, whose seat is arranged in juxtaposition with the engine. In order to lower the loading area of the truck and thus to reduce the amount of heavy work involved by manual loading, the ŠKODA trambus has been equipped with tyres with dimensions of 11,00 x 22 eHD. By using these tyres it has also been possible to increase the maximum speed of the car.

The output of the ŠKODA 706 engine has been raised by 35 H.P., bringing it up to an actual 170 H.P. at 1,900 r.p.m. The springs provided for the driving set and the pneumatic clutch control are newly incorporated

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features. The distance from the front axle to the ground has been increased to 300 mm. The all-metal driver's cab with panoramic windows is elastically seated in suspension from three points and contains four separate comfortable seats. The service weight of this ŠKODA 706 RT model is 5,900 kg and the maximum admissible load is 15,000 kg. The maximum truck dimensions are as follows: length 7,600 mm, width 2,350 mm and height 2,500 mm. With a normal load the ŠKODA 706 RT trambus motor truck is able to have a trailer weighing 8,000 kg and can do this over gradients of up to 20 %. The improved sound-proofing of the driver's cab, its furnishings and the fourfold, inter-dependently operating ventilation results in easier steering and better manipulation. Two heat-conducting heating units blow hot air over the windshield and provide sufficient warmth even at the lowest sub-freezing point temperatures. Prospective customers interested in this novel transport conveyance may inspect it at the grounds of the Third Exhibition of Czechoslovak Engineering in Brno among the exhibits of the firm of MOTOKOV, the exclusive exporter of this motor truck.

Type P R A G A V3S and S5T Motor Trucks.

The P R A G A motor trucks can look back upon a tradition of many years standing and upon a reputation for good and reliable service. Also in its latest models, the well-known and service-tested " V 3 S " and the new truck model " S 5 T ", designed principally for high-way hauling, the factory has fully lived up to its good name. There can be no doubt that the P R A G A V 3 S is one of the very good Czechoslovak motor lorries which ensure reliable and fast travel even under the most arduous ground conditions. Last year a convoy of Czechoslovak motor lorries, among them also several P R A G A V 3 S motor trucks, surprised the world by their admirable performance in the course of their test run across Tibet to Lhasa. These vehicles achieved the feat of negotiating a track leading over thousands of miles in a region of the highest mountains, carrying a full load under these onerous conditions, in half the time it took motor trucks of other world-known makes to run over the same route. These vehicles can be used to particular advantage on building projects. Due to their very small moving dimensions they can easily reach even those places which so far have been more or less inaccessible to motor lorries, except in exceptional cases. The P R A G A V 3 S is a three-axle cross-country truck with a useful carrying capacity of 3,000 kg when driving across open country and of 5,000 kg on a high-way.

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All the axles of the car are driving axles and the truck can be provided with a winch able to produce a tractive effort of 3,000 kg. The winding speed is equal to the 1st speed in low gear, so that in salvage operations the truck can use double power. The requirement of providing seating of the axles which would be as high as possible has been solved by a cleverly conceived and most original design, i.e. the axles have been seated with their centre lines above the centres of the wheels and end transmission gear has been provided for each wheel. In this way the distance from the ground has been increased to a full 405 mm. The crude-oil engine has a volume of 7,412 cubic mm, is air-cooled and has six cylinders in-line and two camshafts. The foremost axle is arranged in front of the engine. The weight distribution of the loaded truck is very favourable since the bulk of the load is carried almost exclusively by the rear axles. For the cooling of the engine a fan is provided, driven by Vee-belts. The clutch is of the single-plate type and has a lining area of 527 square cm. The gear box has four speeds with a further two-speed auxiliary gear box. For smooth riding the car is provided with semi-elliptical leaf springs, while the frame is pressed of steel sheet. The traction force for hooking up behind the truck is 6,000 kg, the service weight being 5,360 kg. The P R A G A V 3 S motor truck can ford a stream of water up to 80 cm deep without being specially adapted for this; with a few inconsiderable changes of the

brakes it can negotiate a fording depth of up to 180 cm. The driver's cab is comfortable and well insulated against noise. It can be tipped forward around two of three fixed bolts. The engine is outstanding in its continuous and unchanging performance even under the heaviest duty conditions. At a speed of 2,100 r.p.m. it produces 98 H.P., giving the vehicle such traction power that it is able to haul a load of 10,500 kg along a highway and 6,100 kg across open country /In both cases the load on the truck itself as well as that carried by a trailer have been considered/. The truck can achieve a top speed of 60 km an hour. It can negotiate gradients of 60 % with a load of 3,300 kg and a gradient of 37 % when loaded with 5,300 kg. The P R A G A V 3 S can be found all over the world, in all zones from tropical regions of eternal sun-shine to the icy wastes of the polar nights. This model can be supplied in a number of designs, as a service truck with box-type body, as a high-speed tipping truck with body of an enclosed cabinet-type, or as tank car. Trucks designed for special purposes can also be supplied.

The new model from the P R A G A automobile works, which has been called the S 5 T, is, in fact, derived from the V 3 S model. Its chassis has two axles and is designed principally for purposes of highway transport. The identical engine gives it a maximum speed of over 70 km an hour, the fuel consumption of the motor truck is approximately 19 litres of crude oil per 100 km, its useful load is 5,000 kg and the trailer can be

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loaded with a further 3,100 kg. The truck body has been improved as compared with the earlier model, the radiator grille has been modified and the driver's cab re-arranged. The distance of the axle from the ground is 290 mm and the six-wheel under-carriage has only rear-wheel drive. In view of its properties this car will, beyond doubt, find a still greater field of application in economic transport than the V 3 S model. A number of test prototypes have given satisfactory results and in consequence the model has gone into production, which will be in full swing before long.

Visitors to the Third Exhibition of Czechoslovak Engineering in Brno can see these motor trucks among the exhibits at the stand of the firm of MOTOKOV, the exclusive exporter of these vehicles.

# A New Line of ŠKODA - 440, 445, and 450 Passenger Motor Cars.

Right from the beginning of the motor car age Czechoslovak automobiles have stood in the forefront, and as motorism has developed, they have always been found among the best and most sought-after vehicles of their kind in the whole of Europe. On motor car races-tracks, in competitions at home and abroad and wherever they have happened to appear their success has been outstanding and they have been favoured among the winners. The ŠKODA cars /which years ago were produced under the trade name of Laurin and Klement/ attained a reputation as reliable transport vehicles of up-to-date design and it can be frankly said that they have lived up to this reputation ever since, bolstering it up again and again with continuous successes. Their participation in long and arduous competitions like the Viking Rally in Norway, the Alpine Race, the Tulpen Rally, the rally Liège - Rome - Liège has only served to confirm their good name in the same way as starts in overseas competitions. In the Australian Redex Competition, which, no doubt, belongs among the most difficult races in the world, the "ŠKODA" car, in a strong field of competitors, finished the almost 17,000 km long track as absolute winner and, due to the splendid performance of the car and crew in that race this victory belongs among the greatest triumphs of the ŠKODA trade mark. We could go on and on in this vein, enumerating all the sporting successes which bear witness to the good work of the designers and workers

at the motor car plant in Mladá Boleslav. At the moment automatic machines and entire automatic flowlines are being set into operation at the factory and the first of these lines, the automatic flowline for the machining of cylinder heads, has deservedly aroused considerable interest even among experts from abroad.

A car which you will meet in ever increasing numbers on Czechoslovak highways and byways is the modern type ŠKODA 440, S P A R T A K model. The production figures of this model are rising in leaps and bounds and a daily output of one hundred cars, finished for export, has already been exceeded. This popular "Spartak" model is a four-cylinder machine with a swept volume of 1,089 cubic cm and with an output of 40 H.P. The engine is water-cooled and extremely smooth-running. The mean petrol consumption value is approximately 7 litres per 100 km. The car can develop a top speed of approximately 115 km an hour, and it will live up to all exacting demands you expect an up-to-date passenger car of this class to fulfill. The car body, designed for roominess and comfort, seats four passengers comfortably. The car has two doors which means that the front seats had to be provided with folding back rests. A luggage boot is located in the rear part of the car body and a separate section of this luggage area is arranged for a spare wheel. Heating of the car interior by hot air and fresh-air ventilation are features of the standard equipment of the ŠKODA 440 model. Modern appurtenances, clever and simple grouping of the control

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instruments on the dash-board so that they are in constant view of the driver, the gear shifting lever on the column housing the steering gear, last but not least, its smart appearance are further reasons for the extraordinary interest this car has roused, and which has made it the centre of attention at home in Czechoslovakia, and in many a foreign country. The car meets all present-day requirements and will therefore remain on the production programme for several years to come.

A variation of the ŠKODA 440 model is the ŠKODA 445, this year's novelty of the automobile factory at Mladá Boleslav. The "Four-Forty-Five" is equipped with an engine which has a volume of 1,200 cubic cm, being the same as that used for the stronger Škoda 1200-Sedan model. The interior equipment of the car has been slightly re-arranged and improved. Judging from the many experiences gained up to date, the designers of this model have actually succeeded in literally combining all the good features of both the "Spartak" and the "Sedan" model.

This season's surprise will be the two-seater SPORTS ŠKODA 450 MODEL, which will go into production during the second half of this year. The prototype of this model will be on show at the Third Exhibition of Czechoslovak Engineering in Brno. The 450 model has been developed on the basis of the design of the Škoda 440. The body of the car has been re-designed to suit a two-seater model and the rear part of the car, in particular, has been re-arranged.

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The new car has an attractive-looking radiator grille with richly chrome-plated fittings, and the engine output has been boosted, which has been achieved principally by the use of two carburettors and a new intake manifold as well as by improving the design of the distributing system. Basically new is also the increased compression ratio. It is planned to introduce in our country as well a new kind of high-octane petrol. The Škoda 450 will reach top speeds of 130 to 135 km an hour, requiring only a moderate amount of fuel. A newly developed system of heating by hot air, greatly improved upholstery and a variety of other adaptations and additions form part of the ample appurtenances of this new model.

You can inspect all these car models at your leisure at the Third Exhibition of Czechoslovak Engineering in Brno, at the stand of the firm of MOTOKOV, the exclusive exporter of these cars.

### Technique and Fashion - Tatra 603

More than twenty years ago a motor car of "drop-like form" passed through the gates of the Tatra works for the first time. This car raised immediately the attention of motorists by its streamline construction as well as by its many technical advantages.

Since then thousands and thousands of similar cars, the famous "Eight cylinders", constantly being improved, and later on "Tatraplans" have left the gates of these works. Even the latest model of the Tatra 603 follows this tradition and is ready to satisfy the highest demands.

This is proved, for instance, by its speed, the maximum of which reaches 170 km per hour. This speed is achieved by a motor of 100 HP, whereby cars of other productions usually need much stronger motors. During a drive the fashionable streamline shape of the car reduces air resistance to a minimum and thus ensures an unusually low fuel consumption - approx 12.5 litres per 100 km even at high travel speeds.

The motor of these cars - as is now the tradition of Tatra cars - is air-cooled. Besides other advantages, it is unusually light - weighing only 160 kg. As a result the hitherto insufficiently favourable distribution of weight has been removed. With the new type only 53 % of the total weight comes on the rear suspension. The distribution of weight is therefore almost ideal. Owing to the new construction of the front suspension a large luggage space has been obtained without having spoilt in any way the symmetry of the streamline body.

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The technical advantages are supplemented by excellent springing, exceptionally effective brakes, suitable speed ranging as well as the equipment of the car interior. All this ensures to a high level comfortable, safe and quick driving not only on main roads, but also on bad thoroughfares.

The motor at the rear - the typical construction of all the above mentioned Tatra types - affords already in advance further possibilities in construction and enables the noise and heat from the interior of the car to be eliminated completely.

The sole exporter is the foreign trade corporation of MOTOKOV, Praha. |||

THEY HAVE A GOOD REPUTATION IN THE WORLD.

The Czechoslovak industry has occupied itself for over sixty years with the production of compressors known all over the world under the trade-marks of ČKD, ŠKODA and ATMOS.

The small producers of compressors in Czechoslovakia who previously occupied a first rank place among the world producers of compressors have been amalgamated into a modern technically well equipped concern known by the name of ATMOS. From the range of the most perfect designs there has been created a number of designs capable of meeting the requirements of even the most exacting customers. This series is continuously being supplemented with new types of simple and purposeful, this fact being illustrated by the Third Czechoslovak Engineering Exhibition in Brno in September of this year.

The ATMOS Works, which employs experts with many years of practice, is continuously increasing the volume of export of its products. A proof of this statement is the ever increasing trend of export to all countries of the world. As early at the beginning of the export of compressors the ATMOS make emerged victorious in official state competitions in Burma, Indonesia and elsewhere due to the sturdy construction and honest workmanship of its products. Recently the ATMOS Works has won a competition in which it competed with several world famous producers such as Jenbacher, Atlas and others in Greece, which fact best testified to the high quality and technical standard of the products bearing the trade-mark.

This does not mean, however, that the ATMOS products gain markets only by means of official public competition. A considerable part of the exported compressors is shipped to the most varied customers all over the world via a network of representatives. The strongest position is held by Czechoslovak compressors in Greece, Turkey, Finland, Iceland, Afghanistan and elsewhere. At the same time their export to all other European countries as well as those overseas is continuously increasing. Visitors

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to this year's Brno exhibition can, however, see for themselves not only the products of the ATMOS trade-mark, but also the giant compressors produced by the world famous Prague firm of ČKD. This factory produces compressors for the compression of various materials such as technical gases of all types, etc. and which can attain an output of as much as 30,000 m<sup>3</sup> per hour at a pressure of 1,000 atm.

They are driven by electric motors, Diesel engines or even steam turbines. For the requirements of beer breweries, sugar factories, chemical factories producing sulphuric acid, nitric acid, etc. the ČKD factory produces turbo-compressors with a capacity of up to 240,000 m<sup>3</sup> per hour and a pressure of up to 3.8 atm. abs. These large compressors and turbo-blowers are supplied by the ČKD Works to the whole world, usually as parts of complete industrial plants such as sugar factories, beer breweries, water towers, etc. The technical standard of these products is best testified to by the fact that the entire enormous capacity of the producer is completely exhausted by foreign orders.

The sole exporter of the Czechoslovak compressors is STROJEXPORT of Prague which can supply you with more detailed information.

POOR ORIGINAL

Czechoslovak Compressors at the IIIrd Engineering  
Exhibition in B r n o .

The contemporary standard and technical development in the branch of piston and centrifugal compressors /including turbo-compressors/ is the result of long years of research work in this field. With the development of mechanisation and industrialization, either in the heavy industry, building industry or in other related branches of national economy, increasing importance is given to the use of compressed air or other gases necessary for various operations.

The most important problem remains, however, the performance of the compressor set, because this is important for the number of equipment for the drive of which the set will serve and is naturally a criterion for the judgment of the efficiency of the compressor itself.

ATMOS compressors may be found in garages, for the inflating of tyres and spraying of car bodies as well as in gardens and orchards for the spraying of trees; ATMOS compressors can be found everywhere, where a permanent uninterrupted supply of air is required.

To a much greater extent ATMOS compressors find application for the drive of pneumatic riveting machines in industry, pneumatic hammers of all types, as for inst. hammers for demolition and drilling operation, which are indispensable in the modern building industry and for road and rail-road construction. By this, however, the extensive possibility of use of ATMOS machines is by far not exhausted. Beside mobile compressors also stationary types are produced. These are especially suitable for use in quarries and mines. Even the foodstuff industry found use for these compressors, either in the fermentation industry or in the industry of meat products.

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Also in agriculture compressors are used, especially rotary, air cooled /used mainly for fecal trucks/. Compressors of this type may by reversed, connecting of the piping be used as vacuum-pumps for the removing of air or chemically pure vapours. A great advantage of these machines is their simple operation, which is limited only to control and to topping up of oil in the oil container. A progress in the manufacture of this series is the exhibited new type VM-200 for 200 cub.m. per hour and a pressure of 7 atm., one of the first types of its kind in the world. For its advantages /small size, almost no stoppage, etc./ it is intended to replace piston compressors in the future. It has the further advantage, that it has an even run, which with a piston compressor without container is not possible.

With regard to these advantages it may be expected, that in the near future piston low pressure compressors for pressures up to 10 atm. will be replaced by rotary compressors. And it is ATMOS, the Czechoslovak factory, which in this direction brings many novelties for the world development of compressors. Compressors of the trade mark ATMOS have in their production programme high pressure sets, which are used for switching stations and switch gear. They are indispensable everywhere, where high pressures are required such as for vulcanization, etc.

ATMOS constructs single and multiple stage compressors, built together with the driving motor and on a common frame. Beautiful designs of compressors of this type are from the constructional point of view the neat types ATMOS WS 3, 2 EKO and WS 6, 2 EKO - intended for larger quantities of air.

Of the above mentioned compressors the following types will be exhibited: ATMOS V 25/1000, V-40-1600, R 200, WS 6.2 P-1/S, PV-2EKO, K 1/S-1000.

POOR ORIGINAL

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Further types of ATMOS compressors are compressors for the building industry, of the mobile type, placed on an undercarriage with tyres. At the Exhibition it will be possible to inspect one of the series, the type DK 4R for 9.3 cub.m./min. and for pressures up to 8 atm.g. Its main feature is an air cooled TATRA Diesel engine, with low revolutions /1,000 rev.p. min./. It is of sturdy design, allowing work even under very difficult working conditions, for longer periods than sets of standard design. The set may travel on the road at speeds up to 60 km per hour.

A further representative of mobile sets is the electro-compressor of the type EK 5, with a compressor of a new design. The six cylinder compressor is of two stage design, whereby 4 cylinders belong to the first stage and 2 cylinders to the second stage. The cylinders are arranged in W form. The performance of the set is 9 cub.m. per min. and a pressure of 7 atm.g. The set is placed on a sturdy four-wheel undercarriage. Transport speed under own power is 60 km/h. The electro-motor driving the compressor has 960 rev. per min., operational voltage 220/380 V, 50 per. The following two types are completely new compressor sets:

DK 320- this set is of modern constructional conception, placed on a undercarriage of tubing, replacing the air tank, which on existing types was placed in the front part of the compressor set. The compressor is of two-stage three-cylinder design, with the cylinders arranged in W form, meaning, that the two side cylinders belong to the first and the middle to the second stage. In order to decrease the possibility of failures, the differential pistons were replaced by single acting pistons. The complete set /performance the same as with the older type DK 3, i.e. 5.4 cub.m. per min. and a pressure of 7 atm.g./ is as compared with the previously manufactured type by far lighter in weight and lower. The set is equipped with a TATRA T-108 Diesel engine.

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DK 600 is of the same design as the above described set DK 320, it is however, a two-stage six-cylinder with a performance of 9.3 cub.m./min. and a pressure of 7 atm.g. The arrangement of the cylinder is again in W form, four cylinders on the outside belong to the first stage, the 2 middle ones to the second stage. The set is again equipped with an air cooled TATRA T-111 Diesel engine, which has 1000 rev.p.min. This type allows the linear reducing of the number of revolutions down to 700 rev.p.m. by throttling.

The latest of the ATMOS Works is a Tractor Compressor of the K-12 type, placed directly on a ZETOR 25 tractor with the aid of brackets. Its performance is 1.5 cub.m. per min. and the pressure 7 atm.g. The compressor is a single stage three-cylinder with arrangement in W form.

The world known "CKD Works" exhibit this year only two compressors, which gained already the recognition of customers in the whole world.

2 SK 200 B - not lubricated compressor for the transport of pure media, in this case air, without a trace of oil. It is mainly used in the foodstuff industry. The lubrication of the pistons is carried out by means of carbon piston rings, so that absolute purity of the supplied air is guaranteed. The compressor is a single stage two-cylinder with a performance of 400 cub.m. per hour and pressure of 6 atm.g. at 600 rev. per min. The necessary electro-motor is of 36 kW.

The last compressor, exhibited at this years Engineering Exhibition is the compressor Type CKD 3 DSK-350. This is a stationary, three-cylinder, two-stage single acting compressor for air for 1600 cub.m. per hour and a pressure of 8 atm.g. at 600 rev.p.min. The input at the shaft during this performance is 195 HP. Compressors of this series are intended for mines, foundries, iron works and other branches of industry.

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They all have the advantages of modern high speed machines, i.e. small size, low weight and possibility of direct connection with the electric motor or other driving motors. The revolutions are selected in such a way, that at the same time long service life, minimal stoppages and simple maintenance as well as operation is guaranteed. The compressors are sufficiently sturdily dimensioned, so that uninterrupted operation is ensured even under the most difficult conditions and in special cases even overloading up to a pressure of 10 atmg. Regulation and control is concentrated to one spot and semi-automatic or completely automatic operation as well as remote control is taken into consideration.

This type of compressors is at present one of the best in the world, as regards performance, reliability in operation, extent of stoppages, etc. It is being produced in large series, so that even if the production is fully covered by demands from home and abroad, a relatively great number may be supplied within a few months/2-10/ which depends on the required number of machines. Visitors to this year's IIIrd Engineering Exhibition in Brno may acquaint themselves in the exposition of the foreign trade corporation STROJEXPORT with the facts, why the trade marks ATMOS and CKD gained the esteem of customers all over the world and why they become more and more popular every year.

[Redacted Box]

The New S L A V I A Four-Stroke Engines.

The assortment of four-stroke engines available in a range of outputs of up to 32 H.P. has been extended by the addition of the new series TS 120 air-cooled engines designed as single-cylinder and twin-cylinder units of an output of from 14 to 16 H.P. per cylinder, at speeds ranging from 1,500 to 1,800 r.p.m. A number of features of the service-tested engines of the TATRA trade mark have been adopted in designing these engines which are distinguished by their low weight, their inconsiderable fuel consumption and their wide range of operating speeds. These engines correspond fully to that group of air-cooled engines which are most in demand. The main parameters of the new TATRA 120/130 series of engines are as follows:

Bore	120 mms
Stroke	130 mms
Mean piston speed $n = 1.800$ 1/minute 7,8 meters/second	
Mean effective pressure	5,45 kgs/square cm
Compression ratio	16,5
Fuel consumption	200 grammes /H.P./hour
Lubricating oil consumption	3 to 5 grammes /H.P./hour
Cooling	By air
Starting	By hand /electric/
Weight of type 1 St 120	280 kgs
Weight of type 2 St 120	390 kgs

The built-up crank shaft runs in anti-friction bearings in the tunnel-type engine crank case. The connecting rod

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STAT

is provided with a steel shell and a lead bronze liner. The engine crank case is flanged on the side of the flywheel for connection to the driven equipment, completing in this way the up-to-date conception of the unit design of the engine, with a low weight. In contrast to the more orthodox design of other, competitive engines, both ends of the crank shaft are available for the pick-up of the full motive power output, a feature of special advantage on marine engines, or else the pick-up can be done directly off the cam shaft at half speed and with full engine output. This advantage will certainly be appreciated by our many customers at home and abroad. Unaffected by surrounding heat, of simple operation, built for a long service and provided with clever and efficient cooling by suction, making it easy to lead off the hot air from the engine room, all these properties of the new engines place them deservedly in the front rank among the very best engines competing for first place on the world markets.

The firm of STROJEXPORT - PRAGUE is the exclusive exporter of these engines.

POOR ORIGINAL

# Czechoslovak Engines of the Š K O D A Trademark

## Gain Valuable Successes!

The designers of the world-renowned Š K O D A works have again scored a valuable success by supercharging the type 6 SL 275 FN engine, using for this purpose a turbo-blower of Czechoslovak manufacture.

Research concerning the combustion area undertaken in the course of the tests established the fact that a different approach to this question would have to be chosen than that originally recommended by the firm of Brown-Boveri.

The results which have been achieved, that is to say, an increase of output by 41 % to 550 H.P. at a speed of 500 r.p.m. and a fuel consumption of 159 grammes/H.P./hour are up to world standard. Apart from modifications of the combustion area, the injection pump, the intake manifold and the exhaust piping it proved unnecessary to make special adaptations on the engine proper. The service-tested, six-cylinder in-line engine with direct fuel injection has thus become the first super-charged low-speed engine of Czechoslovak make which, with its booster /also of Czechoslovak origin/, will herald the excellent quality and high technical skill manifest in the products of the Š K O D A works.

The principal parameters of the engine are as follows:

Rated output	550 H.P.
Rated speed	500 r.p.m.
Revolutions	6

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Bore	275 mm
Stroke	360 mm
Swept volume	128,28 cu. in. cm
Mean piston speed	6 metres/second
Firing order	142635
Temperature of exhaust gases at rated output approximately	530° C
Fuel consumption at rated output	159 grammes /H.P./hour
Weight-to-horsepower ratio of engine	21,4 kgs /H.P.
Turbo-blower, IB 2KG type	PDH 35 N

The firm of STROJEXPORT - PRAGUE is exclusively in charge of the export of these engines.

100% ORIGINAL

SUNDRY NOVELTIES OF THE CZECHOSLOVAK INDUSTRY AT  
THE BRNO EXHIBITION.

Czechoslovak designers and technicians, in cooperation with the workers of up-to-date research institutes, are continually producing new machines and mechanical novelties fulfilling the exacting demands of modern technics. The basic qualities demanded are absolute reliability, efficient design, simple, minimum attendance, economy and maximum performance. One of these novelties in which all these features are to be found is the product of the Dřín Engineering Works - the A T 1521 ACCUMULATOR TRACTOR. This is of excellent use for transport in all industrial works, at railway stations, loading stations, ports, airports and everywhere where it is advantageous to transport by means of trailers.

VÚDUT Praha has produced another practical novelty - the NZV 1200 LOW-LIFT TRUCK with a carrying capacity of 1200 kg and a height of lift 125 mm. This is of excellent service for inter-operation transport, loading and unloading of open and closed railway wagons, trucks, etc. It is a valuable addition to the long line of storage battery and petrol trucks produced in Czechoslovakia.

Another novelty is the MP 1500 MANIPULATION PLATFORM which is suitable especially for the manipulation of pressing forms, heavy material and other loads up to 1500 kg. The sole importer of these novelties is STROJEXPORT - Prague - Czechoslovakia.

DIESEL ENGINES OF FROM 5 TO 2,000 HP.

For several decades the Czechoslovak industry has been exporting its products almost to all countries of the world. The number of those where the Czechoslovak engines have become popular for their high quality and reliability is increasing everywhere. One of the foremost places is occupied by Diesel engines of Czechoslovak make. Their quality is testified to by the fact that in the world production of Diesel engines the Czechoslovak production occupies fourth place - a place of honour. After the Second World War the Czechoslovak Diesel engines penetrated not only to their old, traditional markets, but also to new ones, particularly overseas, where now thousands of reliable engines are serving their owners, engines bearing the well known trade-mark of ŠKODA and SLAVIA.

The Czechoslovak engineers and designers have ensured that the ŠKODA and SLAVIA engines are highly economical in operation and, due to the quality of the raw materials used, perfectly reliable even in the most difficult operating conditions. Their construction is generally noted for its ruggedness which ensures a long service life of the engines even when the operating requirements are more exacting than usual, which often occurs in economically less developed countries. Easy disassembly is a great advantage for their attendants for whom thus not only current maintenance work, but also the usual periodical inspections of the engines are facilitated.

Let us mention some individual types of Czechoslovak Diesel engines. They include engines with an output of 5 up to 2,000 HP and are supplied in executions suitable for all types of current use in industry, transport and agriculture. The designers of the well known SLAVIA motor factory, which produces small engines with a low speed and an output of from 5 to 15 HP and high speed engines with an output of from 6 to 27 HP have to their credit whole decades of successful work. These engines are stationary, four-stroke types which have gained an excellent

**FOR ORIGINAL**

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reputation for their simple, purposeful and robust construction. They are adjusted for operation by unqualified workers and require almost no special expert attention. Engines of all of the SLAVIA trade-mark can be used universally not only in agriculture, but also as driving units in connection with pumps, building machines, narrow-truck railway engines, conveyors and compressors. The high speed types are also supplied in combination with electric generators as stationary or mobile generator sets. In recent years also a marine engine with a 9 HP output has been successfully supplied with complete nautical equipment, this being especially suitable for fishing boats and rescue ships. An order calling for 60 pieces of engines of this type for Finland is at present being dealt with.

In the output range the SLAVIA engines are followed by the products of one of the largest European engineering concerns, the ŠKODA Works. The ŠKODA trade-mark itself is a guarantee of the traditional quality of these Diesel engines of which more and more customers are becoming convinced every day.

Among the smallest types there range the engines of the S 110 series. These belong to the group of unit type engines which includes the 1 S 110, the 2 S 110, the 3 S 110, the 4 S 110 and the 6 S 110 in the designations of which the first number indicates the number of cylinders, the letter S stationary and the letter N naval execution, and the last number - 110 - the inside diameter of the cylinders in millimetres. Other series of ŠKODA Diesel engines are marked analogously. The output per one cylinder is 10 HP at 1,000 r.p.m. or 15 HP 1,500 r.p.m. These engines, in the same way as the larger four, six and eight cylinder types of the 8 160 series with an output per cylinder of 22.5 HP at 750 r.p.m. or 30 HP at 1,000 r.p.m. are very much sought after as reliable sources of electric power in combination with generators or as driving units of excavators, compressors, pumps or mills and, last but not least, as principal or auxiliary marine engines.

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From the range of medium size, high speed engines the ŠKODA engines of the S 140 R series are worth mentioning. These are produced as four, six and eight cylinder engines with a 140 mm bore with an output of from 114 to 228 HP at 1,500 r.p.m.

Recently there has considerably grown the demand for mobile electric power plants with an output of 125 kVA provided with a type S 140 R engine which have proved of great value as emergency sources of electric power. They find suitable application particularly on building sites.

To complete the picture of the Czechoslovak production of Diesel engines it is necessary to note also the ŠKODA engines with higher outputs. The production programme includes engines of the S 220 series with four, six and eight cylinders and outputs of from 160 to 320 HP at 600 r.p.m., the diameter of the cylinders being 220 mm. Engines of the S 230 R series, which have six or eight cylinders, have a somewhat larger bore. The six cylinder engines of this series can attain an output of 400 HP at 1,000 r.p.m. and the eight cylinder engines 500 HP at 900 r.p.m. Engines of the S 275 series with four, six and eight cylinders have an output of 65 HP per one cylinder at 500 r.p.m., while engines with a larger bore, viz. 350 mm, i.e. the engines of the S 350 series which have also four, six or eight cylinders, have an output per one cylinder of 112.5 HP at 375 r.p.m.

The largest series produced types are the powerful engines of the S 525 series with six cylinders which have an output of 1,500 HP at 250 r.p.m. All the above mentioned engines are mostly used for the drive of electric generators in combination with which they form sources fully capable of covering the consumption of electric energy of larger towns or industrial plants.

The assembly of these power sources is usually carried out by experienced technicians and assembly workers of the ŠKODA Works, the engines, generators and switchgear being provided with the most up-to-date equipment.

DOOR ORIGINAL

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Many of the above mentioned types, including novelties in this field, are available to visitors to the Third Czechoslovak Engineering Exhibition in Brno in the exposition of STROJEXPORT, Prague.

Czechoslovak Diesel Engines - All Over the World !

The extensive assortment of Diesel engines which can be supplied by Czechoslovak works has enabled the workers of the foreign trade corporation of STROJEXPORT, which has been entrusted with the export of all Czechoslovak Diesel engines, to open successfully new trade relations even with those countries where formerly the SKODA and SLAVIA engines were only sporadically exported. A thick net of representatives, depots of spare parts, technical centres, qualified technicians and fitters - have all created prerequisites enabling on all continents thousands of SKODA and SLAVIA engines and electrical sets to contribute to increasing the standard of living and facilitating of human work, to higher productivity of industry and agriculture. At international trade fairs as well as independent exhibitions, from Bogota in Columbia, Casablanca in Morocco to distant Rangoon or Colombo in Ceylon, visitors are normally acquainted with the high quality engines of Czechoslovak production. As exhibits are always carefully chosen those types and those executions which can render the best service in the respective sphere. In the last two years STROJEXPORT has exhibited Diesel engines at more than thirty exhibitions and trade fairs. The facts acquired by market research are very promising regarding the development of further sales of the SKODA as well as SLAVIA engines. The representatives of STROJEXPORT value especially durable trade relations, of which we should like to mention in the first place the extensive deliveries for the mechanization of Turkish agriculture, financed by the Turkish bank for the sugar industry. They include more than 3,000 engines of all types, for which perfect servicing is now ensured on the spot. An equally great success is the gaining of an order for deliveries of a hundred Diesel sets for electrification of the Turkish countryside which include units from 50 KVA up to 450 KVA. When in the town of Bandirma a power plant of 550 KVA was put in operation, the representatives of the Turkish Ministry of Public Works expressed themselves very favourably

POOR ORIGINAL

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on the exemplary installation and perfect run of the set as well as on the work of the assembly personnel of the ŠKODA works.

In Egypt there have already been installed for a number of years ŠKODA engines in large pumping stations as well as in the Nile irrigation system. In the past months they have again won in heavy competition, to which fact testifies the acquiring of an order in a governmental tender for two power stations of 700 KVA for the extension of the Facouns and Karf el Sheikh power stations. Since the beginning of this year there have been supplied among other items also several ŠKODA 6 S 275 engines for the newly built Egyptian pumping stations.

An almost monopoly position has been won by heavy ŠKODA Diesel sets in Iran, where already dozens of power stations are equipped with engines and generators bearing the well-known trade-mark of the ŠKODA works. In the Shouch power station in Teheran only ŠKODA sets are installed and their perfect operation has won so many new buyers of further units that this year a considerable part of the Czechoslovak production must be devoted to covering the increased requirements of the Iranian market.

This is certainly a fact which speaks for itself.

In Argentina, too, however, new power stations have been put into operation this year, equipped with heavy ŠKODA Diesel sets; a municipal power station of 1250 KVA with a 6 S 525 engine ranks as one of the most outstanding among them. These large engines were also supplied to Egypt and Bulgaria in past years.

Great popularity has been won by small and medium ŠKODA marine engines in Finland, Burma, Mexico, Turkey as well as Egypt. Hundreds of ŠKODA 6L 275 marine engines with an output of 390 HP have been built in ships sailing on East European rivers or the Black sea and the Mediterranean. That the satisfied owners have had good experience with these engines is confirmed, for inst., by a letter from the owner of the Greek ship EVANGELIA, which arrived at Prague after her maiden voyage from the Greek port of Piraeus to Malta and back. The ship owner described with ardent words the satisfaction of the captain as well as the whole crew with the perfect functioning of the engine on the stormy return journey. The 6L 275 engines have given the same good service in the river tug boats on the Danube.

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The receiving of an order for the delivery of a 180 KVA emergency power station with a 6 S 140 R engine for the building of UNESCO in Paris represents an outstanding success of the ŠKODA make. It is hardly necessary to emphasize that all the more outstanding European producers attempted to obtain this order, also for reasons of prestige.

We cannot quote the many letters from those on South-African farms, Brazilian plantations or Siamese rice fields who are reliably served by the small SLAVIA engines, the easy handling and long life of which their owners praise above all. Therefore consignments for overseas are being continually shipped in Hamburg, Trieste, Gdynia and Rjeka.

The designers of the Czechoslovak Diesel engine works fully realize their responsibility resulting from fifty years of tradition in good service as well as the confidence won from customers on all continents. Therefore they make continuously greater efforts to ensure that the ŠKODA and SLAVIA trade-marks are borne only by products which on account of their high-class quality, represent the world standard of the Czechoslovak engineering industry.

All visitors to the III Exhibition of Czechoslovak Engineering will be convinced of the standard of these exhibits.

DOOR ORIGINAL

# New Engine Types in the Field of Internal Combustion

## Engines of the "ŠKODA" Trade-Mark.

1136000

While the Czechoslovak engine manufacturing industry is distinguished by the introduction of many new types of universal engines as far as the group of engines with outputs of approximately up to 100 H.P. are concerned, the group of engines of medium strength and output has been brought up-to-date principally by incorporating in their design super-charged turbo-blowers for exhaust gases and by all-around re-designing with a view to reducing fuel consumption and lowering the engine's weight-to-horsepower ratio. Progressing in the endeavours in this direction the series S 160 ŠKODA engines have been given a re-designed combustion area, a modification by which a reduction of fuel consumption to 172 grammes /H.P./hour with a tolerance of 5 % has been achieved, a result which certainly is most noteworthy considering the particular output class. At the same time the safety of operation of four-cylinder and six-cylinder engines with an output of 120 H.P. and 180 H.P. respectively has been increased successfully, even at speeds of 1,000 r.p.m. Parallel with these constructional changes the six-cylinder engine has been developed with a supercharger. The results achieved in the course of extensive testing of the engine as well as of the supercharger have fully confirmed expectations and serve to show the high level the Czechoslovak engine

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manufacturing industry has attained in this particular field. A continuous output of 250 H.P. at a speed of 1,000 r.p.m. has been achieved, with a fuel consumption of 164 grammes /H.P./hour and a mean effective pressure of 8.3 kgs per square cm. The weight-to-horsepower ratio of the engine is 9.8 kgs per H.P.

The type FDH 16 H turbo-blower of Czechoslovak manufacture with two inlet branches for exhaust gases has proved to be highly efficient and of great durability during testing operations and is a match for the products of the firm of Brown-Boveri who can look back upon long years of manufacturing tradition in the building of superchargers. The firm of STROJEXPORT - PRAHA is their exclusive exporter of the Czechoslovak internal combustion engines.

POOR ORIGINAL

A Product Up to World Standard -

The Č K D Crude-Oil Railway Traction Engine with Supercharger.

One of the really successful engines is the type Č K D K 12 V DR twelve-cylinder railway traction engine supercharged by a turbo-blower of Czechoslovak manufacture. The engine is of the twelve-cylinder Vee-type with an angle of 50° and with six cylinders in line. The six-throw crankshaft is made of special steel. All pivots are surface-hardened. The shaft is seated in steel shells with lead bronze liners. The connecting rods are arranged in such a way that one of them constitutes the main connecting rod with a suspension eye for the auxiliary connecting rod. The engine crank case is of cast-iron and the crankshaft is suspended in its bottom part. In the upper part, in the space between the blocks, a groove is formed, containing the bearings for the seating of the cam shaft. The cylinder blocks are of cast-iron, cast en bloc for each row of cylinders. Cylinder liners made of special grey cast-iron are fitted in the cylinder blocks. The cylinder heads are also of cast-iron, one separate cylinder head for each cylinder. They have four valves, with an injection valve arranged in the centre. On the rear wall of the engine the operating mechanisms for the cam-shaft, for the injection pumps and for the water pump as well as for the oil pump are mounted. The centrifugal governor together with the hydraulic amplifier are placed on the rear cover in the space between the injection pumps. The bottom part of the engine crank case is covered by a silumin oil tub whose rear section forms the oil tank.

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The principal engine parameters are as follows:

Rated output /Increase 55 %/	700 H.P., at 1.400 r.p.m.
Engine speed	600 to 1.400 r.p.m.
Cylinder bore	170 mm
Stroke	190 mm
Swept volume of set	51,8 litres
Compression ratio	1 : 14
Mean piston speed	6,8 metres/second at 1.400 revs.
Compression pressures approx.	50 atm.abs.
Combustion pressures approx.	75 atm.abs.
Weight of engine	2,900 kgs
Maximum engine dimensions:	
Length	2,310 mm
Height	1,750 mm
Width	1,400 mm
Starting of engine	By two electric starters
Cooling of engine	Water-cooling by means of centrifugal pump

Due to the rated output of 700 H.P. at 1.400 r.p.m. it reaches, this engine must be considered one of the best of its class with a weight-to-horsepower ratio of approximately 4 kgs per H.P. The mean effective pressure of 8,7 kgs/square cm achieved by the engine, its fuel consumption of 70 grammes /H.P./hour at the rated output and its outstanding reliability of performance bear witness to the fact that the Czechoslovak engine manufacturing industry is up to world standard also as far as railway traction engines are concerned.

The export of these engines is exclusively carried out by the firm of S T R O J E X P O R T - P R A G U E .

**DOOR ORIGINAL**

STAT

Dental Equipment at the Third Exhibition of  
Czechoslovak Engineering in Brno

At the Third Exhibition of Czechoslovak Engineering in Brno there will be shown many interesting items of dental equipment, such as a combined motor and oil-pump dental chair with electromotor and foot drives. This dental chair is especially advantageous as it is not put out of operation during possible power supply or electrical wiring failures, as it can be elevated by depressing the raising pedal several times /28 times/. Normally the dental chair can be raised to the required height by the electromotor which is switched on by depressing the long raising pedal located at the side of the chair base. By depressing the short lowering pedal the chair can be lowered. The dental chair is lowered to the lowest position smoothly and without any sudden jolts or jerks. The chair can be elevated from the lowest position, 49 cm, to the highest position, 86 cm, in about 17 seconds. The lowering speed can be adjusted by means of a control screw from 3 seconds to any required time. The dental chair can be plugged to any normal wall socket of 110 V or 220 V A.C. mains. The length of the dental chair is 137 cm; when adjusted to the anaesthetic position it is 203 cm.

The dental chair is elegantly finished. The concentric rings of the circular base, the plates of the footrests, the headrest, the control levers and the foot pedals are chromium-plated, the rest being lacquered in ivory.

POOR ORIGINAL

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All modern needs are met by the CHIRANA "MINIDENT" dental X-ray unit which consists of a tubehead, a manual exposure timer and a folding bracket arm. The tubehead fitted with a plastic cone is fixed to a yoke which is electrically connected to the folding bracket arm by means of a special concentric socket, owing to which the yoke can be rotated about its axis. The tubehead is lead-lined so that dangerous X-radiation in unwanted direction is prevented. The focus cone-tip distance is 100 mm. The total weight of the tubehead is 4.2 kg.

The X-ray unit is controlled by the manual exposure timer the handle of which is provided with two push-buttons. The exposure is started by depressing the larger push-button, while the smaller one is used to reset the exposure time if it has been incorrectly set. The exposure time can be set from 0.05 to 10 seconds in steps of 0.01 sec. The X-ray unit can be operated on 220 V, 50 c/s, single-phase A.C. mains, but it can also be adjusted for operation on a 120 V, 50 c/s A.C. mains.

The tubehead can be adjusted to any required position owing to a flexible and easily movable folding bracket arm which is perfectly counterbalanced and fitted with movable braking inserts. The folding bracket arm is self-retaining in any selected position without any locking.

The MINIDENT X-ray unit can also form a part of the dental unit to which it is mounted by means of a suspension made of steel tubes reinforced by steel sheet. This suspension is provided with an on/off switch and a 10-point socket for connection of the manual exposure timer. This design has been employed, for example, in connection with the CHIRODENT dental equipment.

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The MINIDENT dental X-ray unit is available either as a wall-mounted type or as a mobile stand type.

These and other modern dental apparatuses offer perfect service both to the dentist and his assistants. The sole exporter of Czechoslovak dental equipment is KOVO, foreign trade corporation, Praha, Czechoslovakia.

POOR ORIGINAL

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# Childrens' Bicycle and Cycles for Juveniles.

The technical development which in the last fifty years went ahead with such enormous strides, is reflected also in requirements on childrens' toys and interests of youth. Forty years ago the childrens' bicycle was something special and luxury. Today the Czechoslovak bicycle industry manufactures in series production childrens' bicycles and cycles for juveniles. Its yearly production amounts to tens of thousands and is spread over a number of models. Czechoslovakia supplies not only boys and girls at home, but in a number of foreign countries from Canada to Vietnam.

The number of these bicycles keeps growing and in the course of the present Five Year Plan will amount to half of the entire Czechoslovak production.

## Brief description of the new models:

**START** is in respect of size and light construction intended for the smallest. All equipment is made of duralumin.

**PIONEER** is an improved model of the original childrens' bicycle. It is intended for school children.

**JUNIOR** is a range of models for juveniles. This range has been completed by sports models marked Sp 250, Sd 250 and Sp 255. Their typical features are duralumin cantilever brakes and three speed dérailleur gear.

The entire group of these bicycles is finished in various enamel colours and in gun metal shades.

The Foreign Trade Corporation of MOTOKOV PRAHA is the sole exporter.



## Type KG 60 Sports Perambulator

A luxurious, light weight perambulator the execution of which guarantees its long life and durability. A steel frame made of bent tubular steel with riveted strips is protected against weather with a thick layer of chromium. Its elegantly designed sides are covered with quilted, washable fabric and are provided with polished wooden arm-rests. The back of the perambulator can be tilted into several positions the same being applicable to the foot rest. Both are made of chromium-plated tubular steel. The back is provided with a cushion of quilted washable fabric. The undercarriage and the wheels are chromium plated, the carriage body being supported by four chromium plated steel springs. The wheels, provided with rubber tyres, are protected with chromium-plated mudguards. The handle of the perambulator is of a bent chromium-plated steel tube and can be easily detached, which considerably improves the conditions of transport of the perambulator in public means of transport and of its storage.

The whole perambulator weighs a mere 16 kg, its overall dimensions being 1250x650x680 mm.

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#### Sports Perambulator with PVC Wicker-Work

This is a solid perambulator of rigid construction. Its frame is made of tubular steel and steel strips connected by means of riveting. All visible metal parts are heavily chromium-plated. The back of the seat can be tilted and secured in three positions. The foot rest can be tilted and adjusted in positions for sitting and lying. Both sides and the back are provided with PVC cord wicker-work, the inside of the perambulator being lined with easily washable white fabric. The handle of the perambulator is of a bent steel tube and is heavily chromium-plated. It can be detached easily so that the perambulator requires little transport and storage space. The carriage and the wheels bear steel springs which support seat of the perambulator. The wheels are chromium-plated, provided with rubber tyres, and protected with chromium-plated mudguards.

The perambulator weighs 20 kg, its overall dimensions being 1500 x 650 x 900 mm.



#### Deep Perambulator with PVC Wicker - Work.

A comfortable perambulator in a luxurious execution. The frame of a simple, but sturdy construction is made of tubular steel and is heavily chromium-plated. In the frame a basket-shaped body is suspended, made of PVC wicker-work. The same principle is applied also in the manufacture of the tilting and sliding hood of the perambulator, the use of PVC wicker-work enabling easy washing of the perambulator without any damage to its surface. The inside of the body of the perambulator as well as that of the hood are lined with washable fabric. The frame of the perambulator in the front terminates with a handle, its rear part being provided with another handle enabling carrying of the perambulator on stairs. The perambulator is provided with a detachable cover of quilted, washable fabric. The carriage of bent tubular steel is heavily chromium plated, its shape enhancing the elegant appearance of the perambulator. The frame is connected with the carriage by means of 8 tensile springs.

The suspension of the body of the perambulator increases comfort in passage and reduces the shocks and vibration of the perambulator to a minimum, the jolting caused by uneven ground being damped by the light weight under-carriage and suspension springs. The wheels are of light weight, pressed of sheet steel, heavily chromium-plated, provided with balloon rubber tyres and protected with chromium-plated mudguards.

The weight of the perambulator is 28 kg, its dimensions being 1200 x 725 x 950 mm.

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#### Gas Appliances

##### Latest Novelty - Type MORALUX 250 Automatic Gas Range

The range is provided with four cooking burners, an oven and a grill. The rear burners are of medium size, the left hand front burner being of large size and the right hand front burner the smallest. All burners are provided with automatic lighting. The left hand rear burner is provided with a lighting device ensuring its lighting at a certain time and burning for a certain period. The device is supplemented with a thermo-electromagnetic safety valve preventing any leakage of unlighted gas. The range operates automatically even in the absence of the housewife. The master clock controlling the beginning and length of the cooking period is mounted on a panel located behind the cooking range. The panel contains also a standard clock provided with a buzzer which signals the passage of the set time at intervals of 45 minutes.

The oven is also provided with an automatically lighted burner which can be also set for a certain baking period from a certain time. The oven burner is also provided with a safety valve. The oven is equipped with a thermostatic control maintaining automatically the temperature necessary for baking. The setting of temperatures is continuous ranging from 140 to 320°C, which means that the housewife sets the beginning and end of the baking period and the required temperature, so that it is not necessary for her to be present

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any longer. The door of the oven is provided with double glazing with refractory glass, so that it is possible to inspect the baking process without opening the oven. To ensure better visibility there is an electric bulb situated at the back of the oven which lights the interior of same.

The lower oven is adjusted for grilling. On the sliding bottom there is a lifting stand on top of which the grilling pan is mounted. Radiant heat is supplied, from above by mere turning of a lever, by an upper burner which heats the stainless steel plates.

The left hand part of the range is designed in the form of a cabinet for kitchen utensil, pots, pans, etc.

##### Type 820 MORA Electric and Gas Range

The range is provided with gas burners and an electric oven. The gas part of the installation consists of four automatically lighted burners. On a panel situated below the cooking plate there are six knobs, the two central ones of which belong to the electric oven. The oven has a door provided with glazing and an electric light bulb. Below the oven there is another compartment, closed with a door, which serves for putting aside of kitchen utensils. The burners are concealed with a cover. As optional equipment lateral auxiliary boards can be supplied. The electric oven has standardized dimensions and is provided with standard equipment (a grate, baking pan and two baking tins). The electric light bulb is mounted in a socket in the rear part of the range. The oven has four control points

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marked on the knobs with the figures 0-1-2-3, the third degree (3) having the highest input. The bulb in the oven is alight at all points except for the zero one, thus signalling that the oven is in operation. The input at point 3 is 1200 W.

#### Kerosene Stove

The type 500 kerosene stove is suitable for supplementary heating of living rooms and for the heating of light, ventilated buildings, such as week-end houses, etc.

The stove is of a modern design and adjusted for easy carrying. The surface of its jacket is varnished in pastel colours, the cover being enamelled. The burner of the stove is pressure free. From the tank located at the rear of the stove kerosene flows over a control and shut-off valve by means of gravity into the burner. The whole burner, together with the tank, is easily removable, thus being accessible for cleaning. When the stove is in operation the burner glows and radiates heat into the heated space so that a feeling of thermal comfort is attained in a short while. After tilting away the cover of the stove it is possible to use the latter for heating of meals. The output of the burner can be controlled by means of a knob situated on the front face of the stove. The consumption of the stove is 1 litre of kerosene per 6 hours of operation. The output of the stove is approximately 1,800 kcal per hour, the contents of the kerosene tank being 2,5 litres.

The stove is 450 mm high, 380 mm wide and 280 mm deep, its weight being 8 kg.

#### Type CALORIA 811 Frying Cooker

The smallest household gas cooker is the type 811 CALORIA frying cooker. It has a removable cooking burner with an input of about 1,500 kcal per hr., which can be replaced with an H-shaped burner heating a frying pan for the frying of food in deep fat. It is a suitable and practical gas appliance for small kitchenettes and one roomed flatlets.

#### Type 241 MORA Automatic Gas Range

This range is provided with four cooking burners, one baking oven and one roasting oven. Another new feature is central, automatic lighting of the cooking burners, thermostatic control of the baking oven, a glass window in the door of the oven and its electrical lighting.

#### Type PO 13 MORA Gas Water Heater

The new type of MORA gas water heater, the PO 13, is provided with a draught control in the chimney and an automatic device, mounted in the jacket of the heater, preventing a back draught. Apart from standard automatic fittings, the heater is provided also with a thermo-electric lighting safety valve. The heater is automatically controlled and is capable of supplying several appliances simultaneously. Its output is 13 litres of water heated by 25°C (325 kcal. per min.) which is sufficient for the preparation of hot water for a bathroom and a kitchen.

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#### Type PO 5 MORA Gas Water Heater

This heater is intended for households, barber's shops, medical consulting rooms and similar places where small quantities of warm or hot water are required.

#### Gas Heated Hot Water Tank

For the preparation of hot water in households it is also possible to use gas-heated hot water tanks with a capacity of 80 litres, similar to electrically heated tanks. The tank is provided with a gas burner with non-luminous flames. The tank is not under pressure, being of the overflow type, and is provided with fittings enabling its connection to a hot water pipe line leading, for instance, to a wash basin or sink as well as utilization for these appliances of about one third of the contents of the tank. The tank is provided with automatic fittings with a thermostatic control which automatically shuts off the supply of gas to the burner when the water has reached the required temperature. The safety lighter preventing the leakage of unburnt gas is thermoelectric. The valve closes automatically as soon as the lighting flame is extinguished and does not open the supply of gas to the burner before the lighting flame is alight again. It is actuated simply by means of a push button control.

The capacity of the tank is 80 litres, the water being heated, according to the setting of the thermostatic control, to a temperature of 75 - 85°C. The supply of hot water is sufficient for the preparation of one large or two smallish baths. Cold water is then heated to the required temperature

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in approximately 3.5 hours. The consumption of gas with a heating capacity of 4,000 kcal per 1 m<sup>3</sup> (standard gas from the mains) for the preparation of hot water is about 0.6 m<sup>3</sup> per hr. For this reason the hot water tank can be connected even to a pipe line of very small diameter (1/2") and the smallest type of gas meter is sufficient, installation of the tank thus being advantageous in old houses, where only a pipe line of small diameter is available which does not allow the installation of gas water heaters. The connection of the tank has a diameter of 3/8". Another advantage of the tank is its production of water of 70°C, which is desirable in households particularly for washing up and similar purposes.

The tank is best installed in the bathroom, in the vicinity of the bath, which is filled with hot water from the tank via a pressure-free overflow mixing battery. Connection of the tank to a chimney stack, particularly in small and insufficiently ventilated rooms, is essential.

#### CALORIA Small Radiant Heater

The first of our small gas radiant heaters is a small household appliance, something like a gas "fire", with shock burning. The heater has a pedestal to be stood on the floor. It can be, however, after its removal, also be hung on the wall.

The heater is 450 mm high and 310 mm wide. The jacket and pedestal are made of enamelled cast iron. In the

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lower part of the jacket there is a cast iron gas burner with non-luminous flames controlled by a cock situated at the side of the heater. The flames of the burner set aglow two ceramic elements which attain a red glow at a temperature of 900°C. These ceramic elements radiate the heat over the heater into the heated space. The heater has a small gas consumption equalling approximately that of the large burner of a gas kitchen range. Having a small gas input, it is not necessary to connect it to a chimney stack. Since the flue gases remain in the room in the same way as those resulting from the operation of a gas range or cooker, the heater is not suitable for small and unventilated rooms.

The heater is intended for supplementary heating of living rooms particularly in the transition periods, its great advantage being that its elements are set aglow within 4 - 5, minutes attaining simultaneously full radiant output.

#### MORA 650 Radiant Heater

The type MORA 650 radiant heater is destined for the heating of large rooms with intensive ventilation. In factories and other rooms of similar sizes, where there is an intensive air exchange, either spontaneous (light buildings, stations, etc.) or forced, (purity of atmosphere) it would be uneconomical to heat all the air to a temperature of 16 to 20°C. The same applies also to high rooms and workshops where the workers work only in a few places. It is more advantageous to leave the general air temperature

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somewhat lower (9 - 12°C at the minimum) and to ensure thermal comfort by means of radiant air heaters. Although the radiant effect of the heaters is inferior to the general effect of convection heating, a considerable economy of energy is attained.

Four radiant ceramic elements are heated by the non-luminous flames of a cast iron burner to a temperature of 900°C. Apart from the ceramic elements, heat is radiated also from the cast iron heater proper which is also heated by flue gases. The heater can be tilted by means of adjustment bolt. The cast iron frame with the burner and radiant elements are tilted around the bolts by means of a clamp so that the direction of radiation can be controlled to a considerable extent. The heater is suspended on two suspension bolts and connected to the gas pipe line by means of a dia. 3/8" connection. The lighting sparking plug is connected by means of a clamp to a 24 V supply. Below the heater there is an intercepting plate of sheet steel. The supply cock is controlled from the heated room by means of a system of draw bars.

The position of the burner is adjusted with three adjusting bolts, the supply of primary air being adjusted by means of a bolt.

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#### Bathroom Heaters.

All gas bathroom heaters which are nowadays being produced fall into two groups according to the manner in which they transmit the heat to the area of the room in which they are set up, i.e. convection heaters and radiation heaters.

All conventional room heaters of known types, whose heating element in our case the coils of an electrical helix or a gas burner - heats the greatest possible mass with a large surface area, are, in fact, convection heaters. That large heated surface area transmits the heat to the ambient air flowing past.

With the other group of heaters the sensation of heat is achieved in an entirely different manner. A specially adapted ceramic element is heated up by the heating element until it turns red hot and this ceramic element radiates heat rays directly into the surrounding space, and the heat sensation is therefore direct and immediate.

Comparing both groups of heaters it may be said that, in comparison with radiation heaters, convection heaters will take more time before starting to produce perceivable warmth for the room they are standing in. On the other hand they offer the advantage that their surface will preserve a comparatively high temperature for a longer period before starting to cool off entirely. Radiation heaters produce a heat sensation within a few seconds, or practically immediately after they have been lit, however, once the supply of energy has been cut off, they will cool quickly. The aforesaid characterizes thus both groups of heaters. Convection heaters are best suitable for larger premises and for continuous heating, or in small rooms for short-time intensive heating, while radiation heaters are used to greatest advantage, in particular for immediate supplementary heating or for small rooms, or again to produce a heated area in a large room.

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Type CALORIA 512 Gas-Fired Convection Heaters. These heaters will best be used in large premises and in bathrooms as they are arranged for evacuation of the products of combustion. They consist basically of a cast-iron combustion chamber formed by two ribbed plates embracing the tubular gas burner. Below the ribbed plates a reflector of brightly polished metal sheet is placed which, on the one hand, throws the heat back into the room, and on the other hand, permits to watch the burning of the many little flames of the burner. In order to prevent the rear plate of the heater to uselessly heat up the wall against which the heater has been set up, a hot-air passage has been provided through which the heated air flows over the top surface of the heater into the room. The gas consumption of the heater at full input is approximately 3/4 of a cubic meter.

Type CALORIA 514 Gas-Fired Convection Heaters. They are designed in such a way that the gas burner burns in a sheet-iron combustion chamber of a large surface area. The whole combustion chamber is housed in a white enamel covering which in the direction towards the front terminates in a section grate. An improvement of these heaters as compared with the earlier described type lies in the fact that the opening of the feed cock is mechanically inter-locked with the chimney flap so that the latter closes and prevents evacuation into the chimney whenever the gas supply is cut off and thus keeps the premises from being ventilated to excess. These heaters can be supplied either designed for suspension from the wall/ in bathrooms where little room is available/ or with a base to set the heater up on the floor or the room.

Type CALORIA 513 Gas-Fired Radiation Heater with Ceramic Insertions. This heater constitutes a novel design. In size it will not reach even one fifth of the earlier described models, it has a consumption of approximately 1/2 cubic meter per hour and its thermal output matches fully that of the heaters described higher up. Two oblong ceramic elements of fine section are seated in a cast-iron frame of small size and heated up by a gas burner.

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This heater can be supplied either designed for suspension from the wall or with a pedestal. In view of their inconsiderable weight these heaters are easily portable. The products of combustion rising from the gas burner in upwards direction over the red-hot ceramic elements completely so that no rest of these products of combustion remains, a fact which makes operation of this heater absolutely safe. This radiation is particularly suited for small bathrooms.

All the aforementioned heaters are designed in such a way that they can be adapted for any kind of combustible gas merely by exchanging the nozzles.

The heaters are on view at the display of the firm of MOTOKOV at the machinery exhibition in Brno.

The firm of MOTOKOV are the exclusive exporters of these heaters.

#### RV - Ol Arc Output Regulator .

The RV-Ol output regulator is an auxiliary apparatus for automatic submerged-arc welding for use when the mains voltage varies to a great extent, and when the source of the welding current is a one-phase welding transformer, the static characteristic of which can be smoothly changed by a change in the air gap of the regulating damper. This change is carried out by means of a servo-motor with an accessory gear box, the projecting shaft which moves the yoke of the damper. The servo-motor which can be equipped with an electromagnetic brake is controlled by a reversible contactor the coils of which are connected by means of a relay system.

The measuring member is made up of sensitive polarized relays of which one coil is fed in the necessary range with a smoothly regulated stabilized voltage and the second coil gets its voltage from the welding transformer. This voltage is given according to the form of regulation of the used automatic welder.

In automatic welders with a constant independent/ electrode feed rate /STK 1000/ this voltage is proportional to the arc voltage and is filled up from the secondary terminals of the welding transformer. In automatic welders with an automatic arc voltage regulation /the SUE 2000/ this voltage is directly proportional to the welding current. In this case it is picked up from the ohmic resistance terminals which are connected to the secondary side of the measuring current transformer, the primary of which forms the welding cable of one branch of the welding circuit.

From the economic point of view, the technological conditions permitting, we try to weld with a submerged arc with a one- or more phase A-C current. After coping with the compensation of the effect there remains only one serious disadvantage of welding with an A-C current and that is the effect of the fluctuations

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of the mains voltage on the weld. The output regulator removes this disadvantage and so lowers the number of faulty welds wherever the mains circuit is of small dimensions which, owing to uneven loading during the welding period, causes voltage changes on the primary of the welding transformer /e.g. when field welding furnaces for bloomery forges and cement works/.

Up to now faulty welds could be avoided only by the operator constantly checking the voltmeter measuring the arc-voltage or the amper-meter for the welding current and by means of the pushbuttons maintaining the pre-set welding values; these actions drew his attention away from the servicing and checking of the other parts of the welding apparatus. The output regulator does this automatically and the operator can devote himself entirely to the welding operation itself.

The output regulator guarantees the immutability of the weld dimensions with an exactness of about  $\pm 5\%$  at a fluctuation of the mains voltage of  $\pm 15\%$ . The zone of insensibility of the regulator can be set in three grades according to the required precision of the geometric dimensions of the weld. The lowest insensibility is  $\pm 1,35$  V or  $\pm 30$  amps, according to the type of machine regulation. In connection with a one-phase welding transformer the regulator facilitates automatic flux welding by levelling out long and short changes in the main voltage and enables surer striking of the arc at the start of the welding operation. It can be used to advantage for guarding the lower limit of the arc voltage, if this has to be set for reasons of technology to prevent the danger of the extinguishing of the arc.

The regulator can also serve to maintain arc voltage during automatic carbon electrode arc welding and also the automatic regulation of current to the material or the voltage between the welding wires in the automatic submerged arc welder for a three

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phase current, or for maintaining a constant output of the individual arcs during the mains voltage fluctuations.

The regulator can even be exploited for the automatic setting in grades of the welding voltage of automatic welders for arc-less slag welding if the mains voltage feeding the welding transformer fluctuates more than  $\pm 5\%$  during working periods lasting several hours.

#### Technical Data :

Rated output of the regulator box	V 220, 50c/s
Input of the regulator	V amp. 100
Dimensions	mm 320 x 180 x 270
Weight	kg 8

The regulator is on show at the IIIrd Engineering Exhibition in Brno, in the STROJEXPORT stand.

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#### RNO and RNN Cutting Attachment .

The versatility of the use of common oxygen torches for hand cutting is limited by the simplicity of the apparatus and the accessories that go with it. With the much greater productivity of oxyacetylene cutting /on comparison to shaving operations/ it is important to extend the range of the uses of oxygen cutting past the limits of the universal apparatus and to replace shaving operations wherever possible. The cutting tips RNO and RNN are simple apparatuses of great importance. They are both designed for attaching to the handle of the U3 welding torch and are derived from the RN3 universal cutting tip.

RNO Cutting Attachment is designed for cutting small round holes 20 - 100 mm in diameter. This range of diameters is not in the range of universal cutter compasses and smaller holes are therefore cut by hand without a rest or more often they are drilled. In the former the cut is dirty and uneven requiring further processing and the latter takes longer and means transporting the workpiece to the drill, etc. By using the RNO tip this operation can be done easily and economically in steel of a thickness of 3 - 70 mm.

The RNO Attachment has a cylindrical head with a sleeve, inside which is an eccentrically placed spur with a stay joint made of a hard, refractory alloy. By turning the spur in the sleeve the tip can be prepared for cutting the desired diameter. While cutting, the joint rests in a centre punch mark and the torch is turned round its longitudinal axis. The RNO cutting attachment has one preheating and three cutting nozzles to cover the range of 3 - 70 mm.

Because the leading of the torch is done only by means of the point, i.e. without any significant friction a smooth movement is attained and the cut holes have a smooth surface and often need no further processing.

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RNN Cutting Attachment is designed for cutting off rivet heads during demolition work on steel constructions. The attachment cuts the heads off quickly and cleanly at the level of the riveted plate without dimaging the plate. The body of the rivet can then be easily knocked out on the other side. The cutting with an oxygen torch is not only a lot faster but also much more convenient than chipping with a pneumatic chisel, which is still used for this purpose.

The attachment has a flat copper tip which is firmly joined to the brass intake tube. Two openings for the preheating flame open in the front surface of the head and form either side surround the opening of the cutting oxygen. A sleeve with a hard point is fixed to the intake tubes. During operation the torch rests with the point on the surface of the riveted plates and pivots round it so that the tip travels just over the surface. This enables the torch to be easily and quietly handled even in cases when the surface of the plates is severely corroded or dirtied. The direction of the turning is of no consequence because the preheating flame is reciprocal. The torch is capable of cutting rivet heads up to a diameter of 60 mm. A slight chipping of the edge of corroded rivet heads of a large diameter is recommended to facilitate the start of the cutting operation.

These novelties are displayed in the STROJEXPORT stand.

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#### L 54 Miniature Welding Set.

The L 54 is a miniature oxy-acetylene welding set for delicate welding operations. It can be used mainly for the welding of thin sheets, strips, wires and meshes made of non-ferrous and rare metals /used in fine mechanics/, for the manufacture of meshes for the paper industry, thermic elements, etc. The L 54 is also an excellent tool for goldsmiths, girdlers and dentists. A typical example of its commercial use is the welding of continuous meshed strips for paper machines. In this operation bronze wires of about 0,1 mm dia. have to be welded together so, that the welded seam is no different from the rest of the mesh, because otherwise a faulty place would appear on the manufactured paper. By means of the L 54 and a simple fixture it is possible to solve the problem so, that the welded joint forms two rows of weld drops which duplicate two wires in the mesh.

The welding set consists of the torch handle, the extension and five changeable tips. With the largest tip steel of a maximum thickness of 0,5 mm can be welded, whereas the flame from the smallest tip is only about 2 mm long and can be adjusted only under a magnifying glass. The magnifying glass is of course an indispensable help for fine work and is attached to the torch. The handle of the welding set has needle regulating valves with spindles made of stainless steel. They can be regulated so finely that the regulation fulfills the needs of even the smallest tip which consumes a mere 0,5 l/hour of oxygen and acetylene. The set is of an equal pressure type and is fed by special regulators which are fixed after the conventional reduction valves.

Because the pressure of the gases fed to the torch is negligible the regulator and torch can be connected by soft tubes made of rubber or plastic, a necessity owing to the light weight

of the apparatus and the fine work it is used for. The output of the torch can be altered by means of the tips by a rate of 1 : 10 and this range can be widened by means of the needle valves. It thus enables the choosing of the most suitable size and composition of the flame for the given work. The L 54 is therefore an ideal equipment for fine welding and hard brazing.

This article is exhibited by STROJEXPORT.

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Universal Resistance Welding Machine Controls (for Spot Welders, Welding Presses and Seam Welders).

The accurate control of resistance spot and seam welding machines is today done by means of electronic controls. With this type of control all the technological conditions required of welding by modern industry can be fulfilled in many branches of manufacture. By means of electronic controls resistance welding machines of even the greatest output can be controlled so as to achieve the shortest welding times with a high grade of accuracy. Electronic controls also help to improve the power conditions of the feeding sources. Thanks to their noiseless functioning, electronic controls are a great help in improving the working conditions in welding workshops. Through the use of electronics the functions of spot welding machines and welding presses can be fully mechanized even during the most complex welding cycles.

In principle the electronic controls of spot welders, welding presses and seam welders consist of two controlled electric valves connected crosswise (for small outputs thyristors are used, and ignitions for higher outputs). The contact of the electronic contactor is controlled by a time relay. In this arrangement the electronic valves form the so-called electronic contactor, the function of which is similar to that of the electromagnetic valve. Electronic contactors, which function with a fixed full valve opening of the electronic contactor, do not allow a smooth setting of the welding output, and are, for reasons of their functional simplicity and lower manufacturing costs, non-synchronous. The primary circuit of the welding transformer cannot be

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switched on with these contactors without transition effects, which influence the consistency of the welding current for each weld.

With electronic contactors for the smooth setting of the welding current, the opening angle (ignition) can be smoothly set. These contactors are synchronous (the welding transformer circuit is switched on without transient effects). With these contactors a constant welding current can be obtained, but they are more intricate and even the design of the control relay is more exacting.

The controls of spot welders and welding presses also have an auxiliary time programme (upset, annealing, forging, etc.) according to the technological requirements.

Spot welding machines weld with one or more impulses. In seam welders the impulses alternate with pauses at set intervals.

A universal function of the controls is often required in regard to the great production output of resistance welding machines and the full exploitation of their production capacity and furthermore to enable cheap changeovers in cases of rapid changes of manufactured articles.

In electronic controls manufactured to date the type of control relay is usually designed for each of the welding methods mentioned above. Sometimes the number of impulses is measured by means of the so called overall time, which is not accurate enough. A universal design is also known which has both relays built in, and only the relay for the particular welding method used works. This type of equipment is very complicated and only partly utilized.

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Many research workers are engaged in the problem of designing a really universal type of control. An apparatus of the type EROS - U 200 has been developed in Czechoslovakia. The ignition contactor is of the standard type. The synchronous relay differs from the standard designs.

The relay is designed for synchronous electronic contactors with a smooth control of the welding current. The contactor is D.C. controlled by means of directly time limited voltage "oblongs" which form the control relay. In principle the relay is a thyatron multi-vibrator with electronically controlled impulses.

The apparatus is designed for the precision control of electronic resistance spot and seam welding machines and welding presses. The universal function of the controls is completed with a wide adaptability of the auxiliary time programme.

Various welding cycles can be used with this apparatus. If the apparatus is used solely for the control of seam welding machines it is delivered for use to this end in a single purpose design of the type EROS-S 200 (without the counting device and the auxiliary time programme).

The construction of the apparatus is designed so, that in the event of a breakdown, the faulty part can be easily replaced. Doors with locks prevent unauthorized interference, handling of the equipment and also the switching on of the machine.

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#### Technical Data.

Mains voltage	380 V - 50 c/s
Maximum output at 20% loading	650 kVA
Maximum output at 50% loading	300 kVA
Welding time:	
EROS-U 200	1 to 35 periods
EROS S 200	1 to 25 periods
Pause time:	1 to 25 periods
Number of impulses	1 to 11
Welding and annealing output range	100 to 50%
Adaptation to the cos $\phi$ of the controlled machine	0.8 to 0.2
Construction	Box type.

This novelty is exhibited in the stand of the foreign trade corporation of Strojexport.

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### The T 001 Ionizer .

The use of arc welding with an A - C current is limited by the lower current boundary, at which it is no longer possible to maintain the stability of the arc. In the welding profession the arc stability is maintained in several ways: by the use of covered electrodes, by raising the unloaded voltage of the current source, or by high frequency ionizing. The last mentioned is the subject of this article.

The high frequency device, connected to the welding circuit ionizes the space between the electrode and workpiece when the electrode nears the workpiece and so insures easy striking of the arc. This device for stabilizing the arc is called an ionizer. Ionizer can be either electronic or sparking. Electronic ionizers are rarely used all over the world owing to a number of disadvantages /difficulties in their manufacture, small service dependability, cost./.

Ionizers can be divided into series and parallel ionizers according to their connection to the welding arc. Spark ionizers for parallel connection to the arc have small dimensions and are easily manufactured, but they have to be safeguarded against the welding transformer by a protecting choke which must be designed for maximum welding currents as is the series coil of series ionizers. Parallel ionizers are therefore uneconomic and furthermore they are less effective because the output high frequency voltage is damped by the parallel circuit formed by the protecting high frequency choke and the secondary winding of the welding transformer. Apart from that, this type of connection can in some cases cause a high voltage on the welding torch after charging the condenser, and this can cause fatal injuries. Spark ionizers for series connection are more effective and the spark easily strikes across even large distances. If the high frequency energy transmission to the series coil is done only by induction, the welding circuit is safely separated from

the secondary voltage of the high voltage transformer by a suitable design, so that in no event can an accident occur.

The T 001 type spark ionizer is designed for arc stabilization of all welding sources up to 500 amps. in the normal welding range. The voltage of the secondary winding of the transformer TR charges the condenser C1 until the stored energy reaches the sparking voltage of the sparker discharger J1 and J2. At the moment of sparking the energy stored in the condenser C1 discharges the divided sparkers simultaneously with the transformer, which has a dispersion characteristic, by means of the actual frequency of the resonating series circuit C1, L1; it then extinguishes the sparker discharger and the whole action begins anew. The effective secondary voltage of the unloaded transformer is 2700 V. The transformer TR is of the standard shell type instead of the dispersing transformer which is ordinarily used, the manufacture of which is more costly. The dispersion characteristics are gained by connecting a resistance R before the primary winding of the transformer. By changing the resistance R the characteristic can be altered in a large range. The transformer is so safeguarded against overloading and is immune against short circuits. The ionizer requires no safety fuse.

The twin spark discharger with ground tungsten contacts sparks absolutely regularly and reliably if it is correctly adjusted and is therefore better than the simple spark discharger.

The series resonating circuits C1 L1 has a resonating frequency of about 3 Mc/sec. The coils L1 and L2 are inductively connected and 5 kV high frequency voltage of the same frequency is induced in the coil L2. Coil L2 which is connected to the welding circuit is wound with aluminium strip and is designed for a maximum welding current of 500A at a loading of 60%. The condenser C2 forms a short circuiter for the high frequency voltage and so safeguards the secondary winding against the danger of high frequency fluctuation.

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Technical Data :

Feed voltage	220 V max. welding current	500A
Frequency	50c/sec. loading	60%
Current	0,45 dimensions: width	290 mm
Input	90 W depth	280 mm
Cos $\phi$ effect	0,91 height	330 mm
Output voltage	about 5 kV	
Frequency	3,5Mc/sec. weight	18 kg

This novelty is exhibited at the IIIrd Engineering Exhibition  
in Brno, in the STROJEXPORT stand.